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The Therapeutic and Clinical Drug Review of Thai Traditional Herbal Remedies Extracted from Ancient Thai Medicinal Manuscript Volume No. 3 of Palm Leaf Scriptures

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Abstract

This research is a descriptive and explorative study and is aimed at defining the composition and indication of Thai traditional herbal medicinal preparations which were derived from the ancient Thai medicinal of palm leaf scriptures, chapter no.3, and volume 1. The research investigated by the team of Mahasarakham University committee which consisted of pharmacist, biologists, interpreters and editors. The complete manuscripts contained 5 volumes in Thai Noi, Tham Esarn, khemer and Thai traditional languages. Each traditional medicinal herb diagnosed the symptoms of the patients and treats them with herbal preparations according to their local herbal medicinal knowledge and experiences in order to relieve various symptoms and diseases. These historic formulations were created over a period of hundreds of years before the advent of modern medicine.

Key words: Palm leaf scriptures; Therapeutic treatments; Folk doctor's; Thai traditional herbal remedies

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INTRODUCTION

Herbal Medicine sometimes referred to as Herbalism or Botanical Medicine is the use of herbs for their therapeutic or medicinal value. An herb is a plant or plant part valued for its medicinal aromatic or savory qualities. Herb plants produce and contain a variety of chemical substances that act upon the body. Herbalists use the leaves flowers stems berries and roots of plants to prevent relieve and treat illness. From a "scientific" perspective many herbal treatments are considered experimental. The reality is however that herbal medicine has a long and respected history. Many familiar medications of the twentieth century were developed from ancient healing traditions that treated health problems with specific plants. Today science has isolated the medicinal properties of a large number of botanicals, and their healing components have been extracted and analyzed. Many plant components are now synthesized in large laboratories for use in pharmaceutical preparations. For example vincristine (an antitumor drug), digitalis (a heart regulator), and ephedrine (a bronchodilator used to decrease respiratory congestion) were all originally discovered through research on plants.

HISTORY OF HERBAL MEDICINE

Herbal medicine is the oldest form of health care known to mankind. Herbs had been used by all cultures throughout history. It was an integral part of the development of modern Pharmaceutical or medicinal practices. Primitive man observed and appreciated the great diversity of plants available to him. The plants provided food clothing shelter and medicine. Much of the medicinal use of plants seems to have been developed through observations of wild animals and by trial and error. As time went on

each tribe added the medicinal power of herbs in their area to its knowledgebase. They methodically collected information on herbs and developed well-defined herbal pharmacopoeias. Indeed well into the 20th century much of the pharmacopoeia of scientific medicine was derived from the herbal lore of native peoples. Many drugs commonly used today are of herbal origin. Indeed about 25% of the prescription drugs dispensed in the United States contain at least one active ingredient derived from plant material. Some are made from plant extracts; others are synthesized to mimic a natural plant compound.

Undisputedly the history of herbology is inextricably intertwined with that of modern medicine. Many drugs listed as conventional medications were originally derived from plants. Salicylic acid a precursor of aspirin was originally derived from white willow bark and the meadowsweet plant. Cinchona bark is the source of malaria - fighting quinine. Vincristine used to treat certain types of cancer comes from periwinkle. The opium poppy yields morphine codeine and paregoric a treatment for diarrhea Laudanum a tincture of the opium poppy was the favored tranquilizer in Victorian times. Even today morphine-the most important alkaloid of the opium poppy - remains the standard against which new synthetic pain relievers are measured. Prior to the discovery and subsequent synthesis of antibiotics the herb Echinacea pursuer (which comes from the plant commonly known as purple coneflower) was one of the most widely prescribed medicines in the United States. For centuries herbalists prescribed Echinacea to fight infection. Today research confirms that the herb boosts the immune system by stimulating the production of disease - fighting white blood cells. The use of plants as medicine is older than recorded history. As mute witness to this fact marshmallow root hyacinth and yarrow have been found carefully tucked around the bones of a Stone Age man in Iraq. These three medicinal herbs continue to be used today. Marshmallow root is a demulcent herb soothing to inflamed or irritated mucous membranes such as a sore throat or irritated digestive tract. Hyacinth is a diuretic that encourages tissues to give up excess water. Yarrow is a time-honored cold and fever remedy that may once have been used much as aspirin is today.

In 2735 B.C., the Chinese emperor Shen Nong wrote an authoritative treatise on herbs that is still in use today. Shen Nong recommended the use of Ma Huang (known as ephedrine in the Western world) for example against respiratory distress. Ephedrine extracted from ephedrine is widely used as a decongestant. You'll find it in its synthetic form pseudoephedrine in many allergy sinus and cold - relief medications produced by large pharmaceutical companies. The records of King Hammurabi of Babylon (c. 1800 B.C.) include instructions for using medicinal plants. Hammurabi prescribed the use of mint for digestive disorders. Modern research has confirmed that peppermint does indeed relieve nausea and vomiting by mildly anesthetizing the lining of the stomach. The entire Middle East has a rich history of herbal healing. There are texts surviving from the ancient cultures of Mesopotamia, Egypt and India describe and illustrate the use of many medicinal plant products including castor oil, linseed oil and white poppies. In the scriptural book of Ezekiel which dates from the sixth century B.C., we find this admonition regarding plant life: "and the fruit thereof shall be for meat and leaf thereof for medicine." Egyptian hieroglyphs show physicians of the first and second centuries A.D. treating constipation with sienna pods and using caraway and peppermint to relieve digestive upsets. Throughout the middle Ages, home - grown botanicals were the only medicines readily available, and for centuries, no self - respecting household would be without a carefully tended and extensively used herb garden. For the most part herbal healing lore was passed from generation to generation by word of mouth. Mother taught daughter the village herbalist taught a promising apprentice. By the seventeenth century the knowledge of herbal medicine was widely disseminated throughout Europe. In 1649 Nicholas Culpeper wrote A Physical Directory, and a few years later produced The English Physician. This respected herbal pharmacopeia was one of the first manuals that the layperson could use for health care and it is still widely referred to and quoted today. Culpeper had studied at Cambridge University and was meant to become a great doctor in the academic sense of the word. Instead, he chose to apprentice to an apothecary and eventually set up his own shop. He served the poor people of London and became known as their neighborhood doctor. The herbal he created was meant for the layperson.

The first U.S. Pharmacopeia was published in 1820. This volume included an authoritative listing of herbal drugs with descriptions of their properties uses dosages and tests of purity. It was periodically revised and became the legal standard for medical compounds in 1906. But as Western medicine evolved from an art to a science in the nineteenth century information that had at one time been widely available became the domain of comparatively few. Once scientific methods were developed to extract and synthesize the active ingredients in plants pharmaceutical laboratories took over from providers of medicinal herbs as the producers of drugs. The use of herbs which for most of history had been mainstream medical practice began to be considered unscientific or at least unconventional and to fall into relative obscurity.

HERBAL MEDICINE TODAY

The World Health Organization (WHO) estimates that 4 billion people 80% of the world population presently use herbal medicine for some aspect of primary health care. Herbal medicine is a major component in all indigenous people's traditional medicine and a common element in

Ayurvedic homeopathic naturopathic traditional oriental and Native American Indian medicine. WHO notes that of 119 plants - derived pharmaceutical medicines about 74% are used in modern medicine in ways that correlated directly with their traditional uses as plant medicines by native cultures Major pharmaceutical companies are currently conducting extensive research on plant materials gathered from the rain forests and other places for their potential medicinal value.

Today the U.S. Pharmacopoeia, with its reliance on herbal compounds has been all but forgotten. Most modern physicians rely on the Physician's Desk Reference an extensive listing of chemically manufactured drugs. It is important to note that each entry in this enormous volume in addition to specifying the chemical compound and actions of a particular drug also includes an extensive list of contraindications and possible side effects. Rather than using a whole plant pharmacologists identify isolate extract and synthesize individual components thus capturing the active properties. This can create problems however. In addition to active ingredients plants contain minerals vitamins volatile oils glycosides alkaloids, bioflavonoid and other substances that are important in supporting a particular herb's medicinal properties. These elements also provide an important natural safeguard Isolated or synthesized active compounds can become toxic in relatively small doses; it usually takes a much greater amount of a whole herb with all of its components to reach a toxic level. Herbs are medicines however and they can have powerful effects. They should not tee taken lightly. The suggestions for herbal treatments in this book are not intended to substitute for consultation with a qualified health care practitioner but rather to support and assist you in understanding and working with your physician's advice.

Substances derived from the plants remain the basis for a large proportion of the commercial medications used today for the treatment of heart disease high blood pressure pain asthma and other problems. For example ephedrine is an herb used in Traditional Chinese Medicine for more than two thousand years to treat asthma and other respiratory problems. Ephedrine the active ingredient in ephedrine is used in the commercial pharmaceutical preparations for the relief of asthma symptoms and other respiratory problems. It helps the patient to breathe more easily. Another example of the use of an herbal preparation in modern medicine is the foxglove plant. This herb had been in use since 1775. At present the powdered leaf of this plant is known as the cardiac stimulant digitalis to the millions of heart patients it keeps alive worldwide.

There are over 750,000 plants on earth. Relatively speaking, only a very few of the healing herbs have been studied scientifically. And because modern pharmacology looks for one active ingredient and seeks to isolate it to the exclusion of all the others most of the research that is done on plants continues to focus on identifying and isolating active ingredients rather than studying the medicinal properties of whole plants. Herbalists however consider that the power of a plant lies in the interaction of all its ingredients. Plants used as medicines offer synergistic interactions between ingredients both known and unknown.

The efficacy of many medicinal plants has been validated by scientists abroad from Europe to the Orient. Thanks to modern technology, science can now identify some of the specific properties and interactions of botanical constituents. With this scientific documentation we now know why certain herbs are effective against certain conditions. However almost all of the current research validating herbal medicine has been done in Germany, Japan, China, Taiwan, and Russia. And for the most part the United States Food and Drug Administration (FDA), which is responsible for licensing all new drugs (or any substances for which medicinal properties are claimed) for use in the United States does not recognize or accept findings from across the sea. Doctors and government agencies want to see American scientific studies before recognizing the effectiveness of a plant as medicine. Yet even though substantial research is being done in other countries drug companies and laboratories in the United States so far have not chosen to put much money or resources into botanical research. The result is that herbal medicine does not have the same place of importance or level of acceptance in this country as it does in other countries.

ADMINISTERING HERBAL TREATMENT

Herbs and prepared herbal compounds are available in different forms each of which has its own particular characteristics. Your health food store will have individual herbs as well as complex herbal formulations, including raw herbs, tinctures, extracts, capsules, tablets, lozenges, and ointments. Here's a look at what's 0tincture the preparation contains alcohol. In a tincture alcohol is employed to extract and concentrate the active properties of the herb. Alcohol is also a very effective natural preservative. Because a tincture is easily assimilated by the body it is a very effective way to administer herbal compounds. Tinctures are concentrated and cost - effective. However, the full taste of the herb comes through very strongly in a tincture. Children - and adult's too-may find the taste of some herbs unpleasant. Goldenseal for example is bitter - tasting. Another concern when using tinctures is the presence of the alcohol. If you wish to lessen the amount of alcohol in a tincture before giving it to your child mix the appropriate dose with one - quarter cup of very hot water. After about five minutes most of the taste of the alcohol will have evaporated away and the mixture should be cool enough to drink.

Extracts

Extracts can be made with alcohol like tinctures or the

essence of the herb can be leached out with water. When purchasing a liquid extract of an herb, the only way to be certain of the extraction process (alcohol or water) is to read the label. Extracts offer essentially the same advantages and disadvantages that tinctures do. They are the most concentrated form of herbal treatment and therefore the most cost-effective. They are easy to administer but have a strong herbal taste.

Capsules and Tablets

Capsules and tablets contain a ground or powdered form of raw herb. In general there seems to be little difference between the two in terms of clinical results. Because finely milled herbs degrade quickly, it is important that herbs be freshly ground and then promptly encapsulated or tablet within twenty - four hours of being powdered. When making your selection read the label to make sure fresh herbs have been used in the product. With the exception of certain herbal concentrates in capsule form both capsules and tablets tend to be much less strong and potent than tinctures and extracts.

Teas

There are many delicious blends of herbal teas on the shelves of your health food store they need no introduction here. You'll find loose herbs ready for steeping herbal formulations aimed at specific conditions and convenient pre-bagged teas. Some are just for sipping some are medicinal. When your child is ill a comforting cup of herbal tea (medicinal or not) is a wonderful way to give additional liquids.

Lozenges

Herbal-based nutrient-rich, naturally sweetened lozenges are readily available in most health food shops. You'll find cold - fighting formulas natural cough suppressants some with decongestant properties. Many are boosted with natural vitamin C. Choose lozenges made without refined sugar.

Drug Formula Vol.3
(Mahasarakham University)

1. Indication: Anti- asthmatic Drug

Symptoms: Difficulties in breathing

Drug Composition and Preparation: Macerate one of these plants as follows: *Memecylon scutellatum* Naudin.,*Diospyros ehretioides* Wall., *Rothmannia wittii* Bremek. And then take it as an oral medicine.

2. Indication: Anti- helminthes Drug

Symptoms: worm's infection

Drug Composition and Preparation: Macerate one of these plants as follows: *Irving malayana* (Olive). Ex .A. Benn.in the potable water, then it will be ready for oral medicine.

3. Indication: Osteoarthritis and muscle pain with anorexia

Symptoms: Inflammation in muscles and/or bone joints with loss in appetite

Drug Composition and preparation: Grate root of *Cephaelis Griffithii* Hook. F., then take it as an oral medicine.

4. Indication: Scurvy

Symptoms: Bleeding and pain of gums and lack of vitamin C

Drug Composition and Preparation: Boil all of these plants as follows: *Uraria crinite* L. Desv. ex DC, *Diospyros filipendula pendula* Pierre ex Lecomte, *Naringi crenulata* (Roxb.) Nicholson, *Catunaregam uglinosa* (Poir) Tirveng and then take them as an oral medicine.

5. Indication: Severe Scurvy

Symptoms: Severe bleeding of gums and tooth pain

Drug Composition and Preparation: Boil Elephantopus *scaber* Linn .and administer orally.

6. Indication: Oesophagitis, Gastritis and/ or ulcer

Symptoms: Bleeding and inflammation in alimentary canal

Drug Composition and Preparation: Triturate *Diospyros ehretioides* Wall. *Cassia siamea* Lank, then boil them in potable water, and administer orally.

7. Indication: Pharyngitis with bleeding in the throat

Symptom: Sore throat with bleeding

Drug Composition and Preparation: Triturate *Imperata cylindrica* Beauv., and *Morinda citrifolia* Linn., then boil them in potable water,and administer as an oral medicine.

8. Indication: Anti- Haemorrhoid medication

Symptom: Difficulties in defaecation

Drug Composition and Preparation: Mix and triturate *Sesamum indicum* Linn.and *Citrus medica* Linn.with a small amount of salt, then boil them in potable water, allow to cool and administer orally.

9. Indication: Haematonic Drug

Symptom: enhancement of blood nutrients and stimulation of blood flow

Drug Composition and Preparation: Triturate 7 pieces of *Piperbetle* Linn., 7 pieces of Capsicum *frutescens* Linn., 7 pieces of *Allium sativum* Linn., 7 pieces of *Zingiber offinale* Rox., and mix them, wrap them in a white thin cloth and decoc it in potable water and then use the liquid part to administer orally as an anti-haemorrhoidal treatment.

10. Indication: Antihypertensive Drug

Symptom: Lowering blood pressure

Drug composition and preparation: Crush *Vietnamosasa pusilla* A.Cheval and Camus., *Streptocaulon juventas* Lour.,and then boil them in potable water and take it as an oral medicine to decrease the blood pressure.

11. Indication: Haematonic Drug

Symptom: Lack of blood nutrients, pale

Drug composition and preparation: Grate *Piper nigrum* Linn., *Zingiber officinale* Rox., *Occimum citriodou-*

rum and mix them in the mixture of spirit water, and take it as an oral medicine.

12. Indication: Internal Bleeding

Symptom: Bleeding internally.

Drug composition and preparation: Mix *Diospyros decandra* Lour., *Dracaena loureiri*, then boil them in the potable water,and it will be administered as an oral medicine.

13. Indication: Cardiotonic Drug

Symptom: Irregular in heart beats

Drug Composition and Preparation: Triturate *Sesamum indicum* Linn., *Morinda citrofolia* Linn., *Muntiacus muntjak*, *Saccharum sinense* Roxb., *Coconut hostorium*, then pulverize them with water,and it will be ready for an oral medicine.

14. Indication: Antiprutic Drug

Symptom: Spread of rashes without redness

Drug composition and Preparation: Macerate *Kaempferia galangal* Linn., *Abutilon indicum* Linn. Sweet, *Chasilia curviflora*,In the potable water and it will be ready for an oral medicine.

15. Indication: Antipyretic drug and Antiemetic

Symptom: Fever and high temperature and vomitting

Drug composition and preparation: Boil root of *Zizyphus mauritiana* Lamk., root of *Ficus hispida* L.F., bark of *Spondias mombin* Linn., bark of *Ardisia aprica* Fletchev., then take them as an oral medicine for antipyretic and antiemetic treatment.

16. Indication: Angina Pectoris

Symptoms: Chest and heart pain

Drug composition and preparation: Grate *Ficus hispida* L.F.and *Sansevieria cyrindrica* Bojer., then mix them with milk and then administer orally as an cardiovascular drug.

17. Indication: Anti diarrhea drug

Symptom: watery facae and frequency in defecaetion

Drug composition and preparation: Triturate or grate *Acacia concinna* Wild D.C., *Brassica rapa* Linn., *Oryza sativum* Linn., *Xanthophylumm glaucum*. Wall., *Saccharum sinense* Roxb., then mix them well, and it will be administered as oral medicine.

18. Indication: Antiemetic drug

Symptom: vomiting

Drug composition and Preparation: Grate *Caesalpinia sappan* Linn., ten take it as an oral medicine.

19. Indication: Antihaemorrhoid drug

Symptom: Difficulties in defaecation and painful

Drug composition and preparation: Grate and mix all of these palnts as follows : *Livistonia robinsoniana*, *Phyllanthus virgatus* G. Forst, *Eleusine indica* Linn. *Gaertn. Bambusa* spp., *Sesamum indicum* Linn. and *Saccharum officinarum* Linn., then mix them and it will be ready as oral medication.

20. Indication: Anti histamine, anti infection of skin

Symptoms: Spread of rash and abcess

Drug composition and preparation: Grate root of *Congea tomentosa* Roxb., root of *Saccharum sinenses* Roxb.,*Oryza sativa* Linn., root of *Shorea obtuse* Wall.,root of *Streblus illicifolius* Vidal.and mix them, then take it as oral medicine.

21. Indication: Cardiotonic drug

Symptoms: Heart disease

Drug composition and preparation: Grate *Sesamum indicum* Linn., *Saccharum sinense* Roxb., *Oryza sativa* Linn.., then mix well and take as oral medicine.

22. Indication: Antipruritic

Symptom: Itching and rashes

Drug composition and preparation: Mix and boil these plants as follows: *Sophora exigua* Craib., *Phyllanthus reticulates* Poir., *Abutilion indicum* Linn. Sweet, and *Chasalia curviflora* and filter the liguid part as on oral medicine.

23. Indication: Antipyretic and antidiarrhea drug

Symptoms: Fever and diarrhea

Drug composition and preparation: Boil *Zizyphus mauritiana* Lamk., *Ficus hispida* L.F.and bark of *Spondias mombin* L.,then take the decoction as an oral medicine.

24. Indication: Laxative

Symptom: Difficulties in defaecation

Drug composition and preparation: Grate *Ficus hispida* L.f. *Sanseviera stuckyi*., and mix them with milk and take it as an oral medicine.

25. Indication: Antiemetic

Symptom: vomitting

Drug composition and preparation: Grate *Acacia rugata* Merr., *Brassica rapa* L., *Oryza sativa* Linn., and root of Xanthophyllum glaucum Wall.and it will be ready for oral medicine.

26. Indication: Stomatitis and mucous in the throat

Symptom: mouthsores with mucilage

Drug composition and preparation: Grate root of Gossypium arborreum Linn., then it will be ready as an oral medicine.

27. Indication: Antipyretic and mouthsores

Symptom: Hot flush and mouthsores

Drug composition and prepation: Grate root of *Lagenaria siceraria* Standl., *Sansevieria*, then mix them with the potable water and it is ready for medicine.

28. Indication: Pharyngitis

Symptom: throat infection

Drug composition and preparation: Mix rice water (*Oryza sativa* Linn.) and *Saccharum sinense* Roxb., then administer as a drinking tonic to decrease throat infection.

29. Indication: Vertigo

Symptom: dizziness

Drug composition and preparation: Grate root of *Sauropus androgynus*, stem of *Sauropus androgynus*, root of *Clausena wallichii* Olive. Var., *Gullauminii Molino*, then mix them well and it will be ready as an oral medication. Or Grate root of *Lepisanthes rubiginosa*, *Oxalis*

purpurea Linn., root of *Streblus ilifolius* (Vidal) Corner. then mix them well and it will be administered as an oral medicine for the treatment of sore throat.

30. Indication: Measles and rashes

Symptom: Spreading of rashes and pus of abcess.

Drug composition and preparation: Triturate root of *Acacia rugata* Merr., *Brassica rapa* Linn., root of *Myristica iners* Blume., *Knema corticosa* Lour., *Sauropus androgynus* Linn., *Oryza sativa* Linn., *Saccharum sinense* Roxb.and pulverize them with potable water, then it will be ready as an oral medicine.

31. Indication: Antipruritic

Symptom: Red rashes

Drug composition and preparation: Macerate *Citrus sinensis*, *Dalbergia*, root of *Ficus hispida* L.F., *Saccharum sinenses* Rox., and *Oryza sativa* Linn., then use the liquid solution as an oral medicine.

32. Indication: Osteoarthritis drug

Symptom: Bone and / or muscle pain

Drug composition and preparation: Macerate bark of *Caesalpinia pulcherrima* Sw., root *of Pinanga badia* Hodel., *Oryza sativa* Linn., then mix the liguid part and administer orally for the treatment of Osteoarthritis.

33. Indication: Measles

Symptom: Fever with rash

Drug composition and preparation: Grate root of *Acacia rugata* Merr., *Brassica rapa* Linn., root of *Maerua siampensis* Kurz. Pax., *Knema corticosa* Lour., *Sauropus androgyrus*, *Oryza sativa* Linn., *Saccharum sinensis* Roxb . and add them with small amount of water, then it will be ready for an oral medicine.

34. Indication: Antidiarrhea drug

Symptom: Frequency in defaecation

Drug composition and preparation: Mix and macerate *Hymendictyon orixense* Roxb., root of *Ficus hispida* L.F., root of *Chasalia curviflora*, *Saccharum sinense* Roxb. . *Oryza sativa* Linn., and administer the liguid port as an oral medicine.

35. Indication: Allergy

Symptom: rash, redness

Drug composition and preparation: Mix and macerate *Uvaria rufa* Bl., *Corvus macrorhynchus* Wagler., *Xanthophyllum glaucum* Wall., *Oryza sativa* Linn. withpotable water, then use the liquid portion as an oral medicine.

36. Indication: Antipruritic and antihistamine

Symptom: Rash and itching

Drug composition and preparation: Grate root of *Caesalpinia pulcherrima* Sw., *Pinanga badia* Hodel., *Oryza sativa* Linn. then take the liquid portion as an oral medicine.

37. Indication: Osteoarthritis drug

Symptom: Joint and Bone pain

Drug Composition and Preparation: Macerate bark of *Caesalpinia pulcherrima* SW., root of *Pinanga badia* Hodel., *Oryza sativa* Linn. then them well and take the liquid portion and take it as an oral medicine.

CONCLUSION AND SUGGESTION

The result of this research revealed the uses and the compositions of traditional Thai herbal medicine which were extracted from Mahachai Temple Palm leaf manuscript volume 1 by Mahasarakham University researchers, Thailand. Further study will be the exploration of the area of drug potency, efficacy, safety, adverse reactions, drug interaction, side effects etc., and also the perspective investigations which may involve in the exploration of the benefits in combining Thai historical Palm leaf medicinal manuscripts with the current modern pharmaceutical techniques in order to create an advanced resource the for new formulation of drugs. The study of this research directly links to traditional and modern medicine and may encourage pharmacists and physicians in producing a new approach to alternative medicine in next decade.

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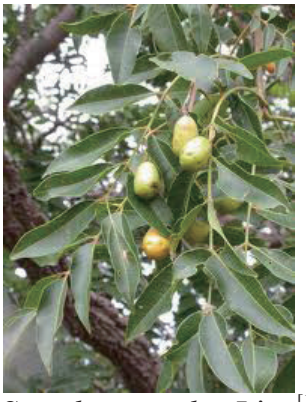
Figures

Diospyros decandra Lour[9]

Irving malayana (Olive)[10]

Diospyros ehretioides Wall[11]



Spondias mombin Linn[12]

Sesamum indicum Linn[13]

Imperata cylindrica Beauv[14]

Sophora exigua Craib[15]

Streptocaulon juventas Lour[16]

Kaempferia galangal Linn[17]

Caesalpinia sappan Linn[18]

Allium sativum Linn[19]

Naringi crenulata (Roxb.)[20]