COMPILATION, EXPLANATION AND RESTORATION OF MOH PHON'S HERBAL FORMULATIONS FOR SKIN CONDITIONS

Miss Qiaoling Ye

A Thesis Submitted in Partial Fulfillment of the Requirements

for the Degree of Master of Science in Public Health Sciences

COLLEGE OF PUBLIC HEALTH SCIENCES

Chulalongkorn University

Academic Year 2021

การปริวรรตตำรายาหมอพรเฉพาะสูตรตำรับยาสำหรับกลุ่มอาการทางผิวหนัง

น.ส.ไคว่หลิง เย่อ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

สาขาวิชาวิทยาศาสตร์สาธารณสุข ไม่สังกัดภาควิชา/เทียบเท่า

วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2564

Thesis Title	COMPILATION, EXPLANATION AND RESTORATION OF MOH PHON'S HERBAL FORMULATIONS FOR SKIN CONDITIONS
By	Miss Qiaoling Ye
Field of Study	Public Health Sciences
Thesis Advisor	ANCHALEE PRASANSUKLAB, Ph.D.
Thesis Co Advisor	Onuma Zongrum, Ph.D.

Accepted by the COLLEGE OF PUBLIC HEALTH SCIENCES, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Science

Dean of the COLLEGE OF PUBLIC HEALTH SCIENCES

(Professor SATHIRAKORN PONGPANICH, Ph.D.)

THESIS COMMITTEE

Chairman

(Associate Professor WATTASIT SIRIWONG, Ph.D.)

Thesis Advisor

(ANCHALEE PRASANSUKLAB, Ph.D.)

Thesis Co-Advisor

(Onuma Zongrum, Ph.D.)

Examiner

(TEPANATA PUMPAIBOOL, Ph.D.)

External Examiner

(Assistant Professor Rawiwan Charoensup, Ph.D.)

ไคว่หลิง เย่อ : การปริวรรตตำรายาหมอพรเฉพาะสูตรตำรับยาสำหรับกลุ่มอาการทางผิวหนัง. (COMPILATION, EXPLANATION AND RESTORATION OF MOH PHON'S HERBAL FORMULATIONS FOR SKIN CONDITIONS) อ.ที่ปรึกษาหลัก : อาจารย์ ดร.อัญชลี ประสารสุขลาภ, อ.ที่ปรึกษาร่วม : อาจารย์ ดร.อรอุมา ซองรัมย์

ตำรายาสมุนไพรตำรับหมอพรเป็นตำรายาที่เขียน รวบรวม และจดบันทึกโดยกรมหลวงชุมพรเขตอุดมศักดิ์หรือหมอพร ที่แล้วเสร็จในปี พ.ศ.2458 การศึกษานี้มีวัตถุประสงค์เพื่อปริวรรตตำรายาหมอพรที่เป็นภูมิปัญญาทางการแพทย์แผนไทย โดยศึกษาเฉพาะสูตรตำรับยาสำหรับกลุ่มอาการทางผิวหนัง การศึกษานี้ได้รวบรวมตำรับยาที่ใช้สำหรับกลุ่มอาการทางผิวหนังและวิเคราะห์พืชสมุนไพรที่พบในตำรับยาด้วยการระบุชื่อท้องถิ่น ชื่อวิทยาศาสตร์ การบรรยายลักษณะพืช การใช้ประโยชน์ทางด้านยาพื้นบ้าน ฤทธิ์ทางเภสัชวิทยา สารสำคัญที่พบ และความเป็นพิษ โดยวิธีการทบทวนวรรณกรรมที่เกี่ยวข้องตามหลักการทางวิทยาศาสตร์ รวมทั้งการวิเคราะห์ความถี่ของพืชสมุนไพรที่ใช้ในตำรับยาด้วย สูตรสำหรับ 26 อาการหรือโรคในผิวหนังพบได้ใน 32 บทในสูตรยาแผนไทยของหมอพร วิธีใช้ ได้แก่ ตำ ขยี้ ย่อย บีบ ตัด ผสม เคี้ยว เผา ทอด ตำ ยาพอก ดื่ม คลุม ถู อาบน้ำ รับประทาน พืชสมุนไพรที่พบจำนวน 66 ชนิด เป็นพืชใบเลี้ยงคู่ จำนวน 54 ชนิด (31 วงศ์) และพืชใบเลี้ยงเดี่ยว จำนวน 12 ชนิด (8 วงศ์) พบพืชในวงศ์ปาล์มที่มีการใช้มากที่สุด (ร้อยละ 18) รองลงมาเป็นพืชในวงศ์ถั่ว (ร้อยละ 14) พืชในวงศ์ย่อยของวงศ์พลับพลึง (ร้อยละ 12) และพืชในวงศ์มะเขือ (ร้อยละ 11) ส่วนพืชสมุนไพรที่มีการใช้มากที่สุด 5 อันดับแรก ได้แก่ มะพร้าว (ร้อยละ 14) มะนาว (ร้อยละ 5) กระเทียม (ร้อยละ 4) หอมแดง (ร้อยละ 4) และชุมเห็ดเทศ (ร้อยละ 4) การศึกษานี้ได้จัดทำข้อมูลทางวิทยาศาสตร์ของพืชสมุนไพรที่พบในตำรายาหมอพรโดยเฉพาะสูตรตำรับยาสำหรับกลุ่มอาการทางผิวหนัง ซึ่งจะมีประโยชน์ต่อการยืนยันชนิดของพืชสมุนไพรและคุณภาพของตำรับยา

สาขาวิชา	วิทยาศาสตร์สาธารณสุข	ลายมือชื่อนิสิต .....
ปีการศึกษา	2564	ลายมือชื่อ อ.ที่ปรึกษาหลัก .....
		ลายมือชื่อ อ.ที่ปรึกษาร่วม .....

6278501953 : MAJOR PUBLIC HEALTH SCIENCES

KEYWORD: Moh Phon Traditional Thai medicine skin diseases Medicinal plant

Qiaoling Ye : COMPILATION, EXPLANATION AND RESTORATION OF MOH PHON'S HERBAL FORMULATIONS FOR SKIN CONDITIONS. Advisor: ANCHALEE PRASANSUKLAB, Ph.D. Co-advisor: Onuma Zongrum, Ph.D.

Moh Phon's traditional Thai medicine formularies were developed, compiled and recorded by Abhakara Kiartivongse or Moh Phon until 1915. This study aimed to elucidate traditional Thai medical wisdom regarding to Moh Phon formularies, especially for skin diseases. Herbal crude drugs in Moh Phon's traditional Thai medicine formularies for skin diseases were compiled and authenticated for their vernacular and scientific names. The descriptions of plant species, ethnomedical uses, pharmacological activities and active constituents and toxicities were scientifically reviewed and established. The prevalence of plant species used in the formularies was analyzed. The formularies for 26 symptoms or diseases in the skin were found in 32 chapters in Moh Phon's traditional Thai medicine formularies. The methods of using were pound, rasp, decoction, crush, crumble, digestion, sqeeze, cut , mix, chew, burn, fried, and apply, poultice, drink, cover, rub, shower, eat. A total of 66 species and 57 genera were characterized and were divided into 54 dicotyledons (31 families), 12 of monocotyledons (8 families). The most frequent botanical families were Arecaceae (18%), Fabaceae/Leguminosae (14%), Alliaceae (12%), Solanaceae (11%), and Zingiberaceae (11%). Frequent species were Cocos nucifera L. (11%) and followed by Citrus aurantifolia Swingle (5%) and Allium sativum L. (4%), Allium ascalonicum L. (4%), Cassia alata (L.) Roxb (4%). The scientific information of Moh Phon traditional Thai medicine formularies for skin diseases was provided. Plant species were characterized for crude drug authentication and quality of medication.

Field of Study:	Public Health Sciences	Student's Signature .....
Academic Year:	2021	Advisor's Signature .....
		Co-advisor's Signature .....

ACKNOWLEDGEMENTS

The author wishes to express her deepest gratitude and appreciation to her thesis advisor, Dr. Anchalee Prasansuklab, and her thesis co-advisor, Dr. Onuma Zongram and to, Associate Professor Dr. Chanida Palanuvej and Associate Professor Dr. Nijsiri Ruangrungsi for their guidance, valuable suggestions, encouragement and support throughout the course of this study.

Sincere gratitude for the valuable knowledge and constructive suggestions from the thesis committee members, Chairman Assoc. Prof. Dr. Wattasit Siriwong, Dr. Tepanata Pumpaibool and external examiner Asst. Prof. Dr.Rawiwan Charoensup in finalizing this thesis.

The author is thankful to His Royal Highness Admiral Prince Abhakara of Chumporn Family's Foundation for the valuable insights of the lives of Moh Phon.

The anthor would like to express her gratitude to all staff members in College of Public Health Sciences, Chulalongkorn University and other people whose names have not been mentioned here for helping her through her study.

Qiaoling Ye

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

Background and Rationale

Since the 21st century, with the gradual maturity of research on medicinal plants and the gradual improvement of pharmacological effects, medicinal plants have been considered beneficial future medicines for health care. The trend from synthetic drugs to herbal medicines has recently changed, called the "return to natural therapy." Herbal plants have been used from ancient times to the present, and as a method of preventing and curing diseases, their rich sources are famous worldwide. Ancient Chinese and Egyptian papyrus descriptions described the pharmacological uses of plants as early as 3000 BC. Indigenous cultures such as African and Native Americans use herbs in their healing habits. Moreover, the same is true for other mature traditional medical methods. Siddha, Ayurveda, and Unani; these traditional therapies that have been successfully used and are widely popular[1]. Herbs are used in almost all nations and regions around the world. Some of them are long-term and ancient formularies[2]. At present, people usually pass on the knowledge of traditional medicine and various medicinal plants from generation to generation through oral teaching. Many plants have been identified as useful medicinal plants [3]. Patients may not reach proper treatments as the authoritative source of medication is out of the cover from public health systems in some countries [4]. Traditional medicine, mostly herbal medicine, is

considered an essential medical supporter worldwide, especially in still backward areas and places inconvenient for transportation. Many people rely on this treatment for their primary health care, especially in underdeveloped or developing countries.[5]

The health benefits of herbs and herbal medicines are increasingly recognized worldwide. The World Health Organization (WHO) supports traditional medicines worldwide for the safely and effectively use this precious natural resource [6]. As one of the essential complementary and alternative medicine elements, more and more people accept herbal medicine. However, the methods used related knowledge is not comprehensive.

This study obtained scientific insights into using Thai herbal medicines from the purpose of use, the efficacy of the type of disease, the reason for the preferred usage and the source of information, *etc*. [7]. WHO's strategy emphasizes traditional medicine development instead of conventional medicinal products, as in the E.U. regulatory framework. "Traditional medicine" is defined by WHO as: "Traditional medicine has a long history. Since ancient times, plant medicine has been a valuable source of medical treatment. Many modern medicines or treatments are derived from plants and their products [1].

Traditional treatment is the accumulation of habits, beliefs, experiences, skills, and practices rooted in different cultural concepts. The health benefits of plants and plant products have permeated many traditional plant diets since ancient times. Since ancient times, traditional Thai doctors have continuously used experience and wisdom

to improve various prescriptions [6]. Since ancient times, people have considered plant medicines' methods and advantages for health care. A long time ago, due to early people's observation and use of plants encountered in life as energy, clothing, housing, and food, humans gradually realized the specific functions of plants.

Whether these concepts can be used to improve health and prevent, diagnose, improve or treat physical and health or mental illness remains to be verified [8]. Traditional herbal medicines have long discovered the importance of medicines and insecticides. Most traditional herbalists are fascinated by plants' chemical diversity and complexity and have found many beneficial medicinal ingredients. Written history traces Mediterranean and European medical traditions back to Greek antiquity [10]. In almost all cultural roots, plant medicines are used as medical resources. Including the Middle East [11]. Herbs have been used to treat a variety of diseases that are constantly developing around the world. About 80-85% of people (about 6 billion) in the world trust herbal medicines and use them to treat various diseases[9]. Archaeological evidence shows that regarding the use of medicinal plants, as early as the Paleolithic, the Sumerians had established the first list of herbal medicines 5,000 years ago [73, 74].

In Thailand, most traditional treatments came from the Ayurveda (Knowledge of Life), which is ancient (before 2500 BC.) India's healthy herbal remedies. It involves the general application of people, health, and disease. Ayurvedic therapy treats diseases, including strict enforcement of medicines, food, and specific lifestyle habits. Medicinal

preparations are invariably complex mixtures based mostly on plant products. Around 1,250 plants are currently used in various Ayurvedic preparations[12]. Ayurveda is the oldest traditional medicine in India. Other traditional systems of Indian medicine also include Unani and Siddha. These medical methods integrate the human body's physical, psychological and spiritual functions to protect people's health [1]. Evidence shows that the phenomenon of plant cultivation as a drug appeared 60,000 years ago. In countries such as China, Greece, Egypt, and India, medicinal plants have become one of the oldest medical sciences. In ancient Persia, plants were often used as medicines, disinfectants, and fragrances [11].

In Thailand there is a book called *Moh Phon's Traditional Thai Medicine Formulary.* The author is Prince Abhakara (1880-1923). December 19th is the Birthday Anniversary of Admiral Prince Abhakara Kiartivongse, who has been reverently recognized as "the Father of Thai Navy" or as "Sadej Tia" (Thai: เสด็จเตี่ย; lit. Lord Father), and also known as "Moh Phon" (Thai: หมอพร; lit. Doctor Phon). As a young boy, he studied Naval Science in England and returned with the strong determination to strengthen and develop the country's naval force. Because of his vision and the strong foundation he laid for the navy, the Thai naval force has improved and continuously improved and grown stronger. His ability in the medical field was also widely recognized and appreciated. He is the actual role model of determination and dedication as the above-mentioned rhyme he wrote and also his famous line in Bali, "Ka-yi-ra-je Ka-yi-ra-te-nang," which means "do things with all your might." from the entire line "Work While you Work, Play

While you Play, That is the Way, To be cheerful and gay, All that you do, Do With your might, Things done by half, Are never done right."

Prince Abhakara studied medicine. He was particularly interested in using herbal medicine in treating his patients as a practitioner of the Thai traditional sciences, occultism, and traditional medicine, popular in public spaces and seeking social acceptance [14].

This review comprehensively introduces the various medicinal plants used to treat skin diseases in various Tables and reviews. In order to enhance credibility, comprehensive data collection and analysis methods are necessary [7]. This study investigates the remedies for symptoms or diseases along the skin condition mentioned in Moh Phon's formulary and medicinal plants. This study also aims to provide supporting reviews of the pharmacological and or biological activities and toxicity properties together with active constituents reportedly found in any parts of those plants that may help their ethnomedical uses as in Moh Phon's formularies [3].

Among all kinds of diseases in the book. The study focus on Skin diseases. Skin diseases are common diseases worldwide—skin problems and diseases that seriously affect the skin healthy, even long-term, and are difficult to heal. The skin is the largest external organ of the human body that covers the body. Skin diseases affect people of all ages and genders, and infectious skin diseases are widespread in tropical countries and regions. Skin diseases account for 34% of all diseases and are the most common among rural people. Most plants that treat skin diseases have pharmacologically

confirmed pharmacological properties, such as anti-inflammatory, antimicrobial, antiviral, anti-cancer drugs, hemostasis, and analgesia. In the literature, in many works of literature and published reports, many successful examples of using various plants to fight wound healing, wound sores, swelling, sores, and other skin infections have been proposed[13]. In this case, the emergency to study the herbal plants relating to skin diseases plays a crucial part in studying skin problems worldwide.

Objectives of the study

To collect the remedies for skin symptoms / diseases were investigated.for skin conditions from the second edition of book called *Moh Phon's Traditional Thai Medicine Formulary* published by Thai Quality Books Company Limited in 2013.

To identify with the authentication from the Famous Botanist from Thailand, in recognizing the medicinal plants' species used in Moh Phon's Thai traditional medicine formularies for skin conditions with scientific names, family name, plant part used, and utilization method.

To systematically review the literature of medicinal plant species used in Moh Phon's Thai traditional medicine formularies for skin conditions on their ethnomedical uses, active constituents, biological and pharmacological activities, and toxicity properties.

To analyze frequent plant families and species in Moh Phon's Thai traditional medicine formularies for skin conditions.

To provide the related proves for the effecacy on skin conditions from the frequent families and species used in the *Moh Phon's Traditional Thai Medicine Formulary.*

Conceptual Framework

The second edition of Moh Phon's Thai Traditional Medicine Formulary
Published since 2013.

Compilation

- Collect information of Moh Phon's Thai traditional medicine formulary
- Identify formularies for skin conditions or symptoms or diseases

CHAPTER II

LITERATURE REVIEW

This chapter contains the relevant literature and previous research related to this study, including five essential topics.

2.1 Brief History of Thai Traditional Medicine

2.2 History of Moh Phon Thai traditional medicine formularies

2.3 Human skin

2.4 Skin conditions and treatments

2.5 Previous studies on medicinal plants related to skin conditions

2.1 Brief History of Thai Traditional Medicine

Ancient Thai medicine and medical treatment originated from the unique experience of residents in various regions in prehistoric times. It has a deep animism tradition. Before spreading to the Thai, the Mon and Khmer people who occupied the area had animism. The knowledge of Thai medicine and animism, Indian medicine and Khmer experience (knowledge and experience before arriving in Ayurveda), Buddhist medical theories of the Mon people, and China following the spread of Tai Chi people (mainly from southern China), Medical theory (time before the current TCM) [17, 18]. At the beginning of the 1900s, people thought traditional medicine was "understood as useless medicine," and Western medicine was trendy. However, in the mid-1990s, the Thai government slowly began to re-promote traditional medicine. The Seventh National Economic and Social Plan from 1992 to 1996 stated: "To improve human health, it is necessary to work harder to promote ancient medical care in health care, including traditional Thai medicine, herbal medicine, and traditional massage, and integrate them into the modern medical and health system. "In 1993, the Thai government established the National Institute of Traditional Medicine in Thailand

under the Ministry of Public Health management. The institute aims to "systematize and standardize traditional Thai medical knowledge," "collect knowledge, correct, test, classify and label traditional Thai medical knowledge," and "compare and explain the philosophy and basic theories" of Traditional Thai medicine and make textbooks on traditional Thai medicine"[19]. There are about 391,000 species of vascular plants currently known to science. It was estimated in 2016 that 17,810 plant species have medicinal use, out of some 30,000 plants for which use of any kind is documented. [15]. Including skin symptoms [16].

2.2 History of Moh Phon's Thai traditional medicine formularies

Moh Phon's Thai traditional medicine formularies were developed and handwritten by the Prince of Chumphon until 1915 and named "พระคัมภีร์อติสาระวรรค โบราณกรรมและปัจจุบันกรรม." Initially, the ancient document was recorded on Thai-style paper made from bark fibers of such plants as Siamese rough bush (khoi). This textbook is 14 inches long and 5 inches wide, and 2.5 inches thick covers Thai traditional medicine formularies for the treatment of various diseases or symptoms such as skin conditions, heart diseases, cancer, diabetes, tuberculosis, fever, and respiratory diseases, and gastrointestinal diseases. This textbook is currently kept in Prince Abhakara Kiartivongse's Museum at Royal Thai Navy Hospital (Somdet Phra Pinklao Hospital), Bangkok, Thailand.

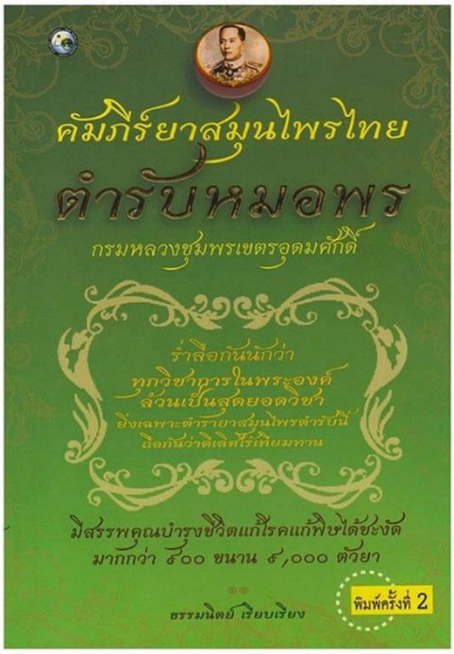


Figure 1 The second edition of *Moh Phon's Thai Traditional Medicine Formulary*

Prince of Chumphon, Admiral Prince Abhakara Kiartivongse, (19 December 1880-19 May 1923), (Thai language: พระองค์เจ้าอาภากรเกียรติวงศ์: Phra Ong Chao Aphakon Kiattiwong, Full title in the Thai language: พระเจ้าบรมวงศ์เธอ พระองค์เจ้าอาภากรเกียรติวงศ์ กรมหลวงชุมพรเขตอุดมศักดิ์: Phra Chao Borom Wongthoe Phra Ong Chao Aphakon Kiattiwong Krom Luang Chumphon Khet Udomsak), was the 28th son of King Rama V (King Chulalongkorn). His familiar other names are Sadet Tia ("Father of the Royal Thai Navy") or Doctor Phon (Moh Phon), or Prince of Chumphon, who will command deep respect from the Thai people.

Figure 2 Prince Abhakara Kiartivongse, Prince of Chumphon

Prince of Chumphon spent six years in the U.K. studying at the Royal Naval Academy. Upon returning to Thailand, he held many important positions in the Royal Thai Navy and became the Commander of the Navy in 1922. He is noted for modernizing the navy and creating a professional officer.

In addition to his career in the navy, Prince Chumphon is also known as a herbal doctor, a boxer, and an artistic painter. In herbal medicine, he studied medicine from many physicians like Praya Phitsanuprasartvet (Kong Thavorndej), the chief royal physician of the royal court of Thai traditional medicine, Doctor Botoni from Italy, and Doctor Mittani from Japan. Also, he learned from many textbooks on Thai traditional medicine. He had a particular interest in herbal medicine that he invested a great deal in setting

up a laboratory room for researching and experimenting with herbal medicines. Moreover, he provided medical services to the people without any charges and asked their patients to call him "Moh Phon" ("Moh," physician or doctor, was the term generally used by residents to call someone knowledgeable about and capable of providing medical treatment to patients). Moh Phon is a great physician who was knowledgeable about the medical treatment of diseases, especially in Thai traditional medicine.

2.3 Human skin

The skin is divided into three layers. The epidermis is the outermost layer of the skin, which functions as a waterproof barrier and constitutes our skin color. The dermis below the epidermis comprises tough connective tissue, hair follicles, and sweat glands. Finally, the deeper subcutaneous tissue is composed of fat and connective tissue.

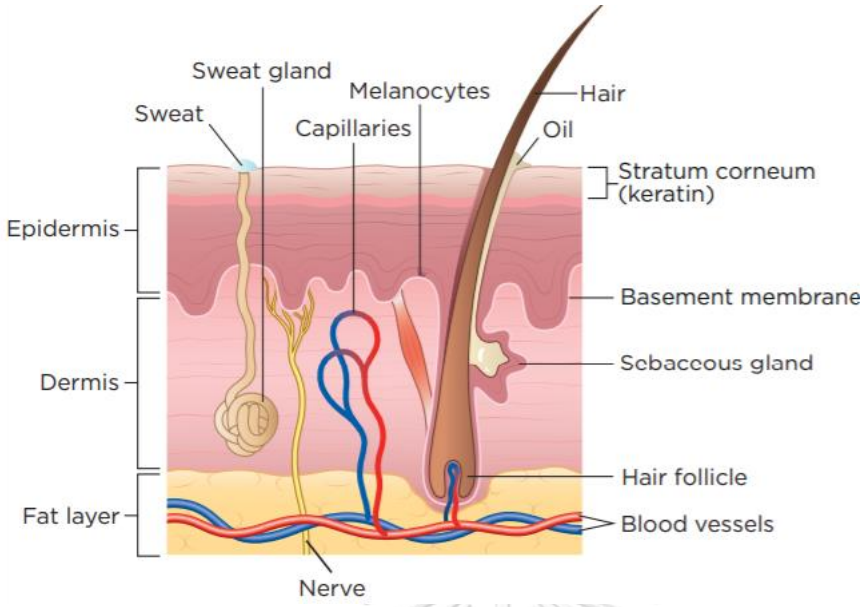


Figure 3 Skin Anatomy [20]

Skin is the largest organ in the human body; skin is 1.5 to 2.3 m^2, in the accounting of full-body is 60 kg, skin is about 3 kg, comparing to the liver is 1.5 kg, which takes the place of body weight about 2.5%, skin taking 4-6 % body weight. The epidermis is related to the nerve systems form to show the problems of the body nervous internet diseases. The dermis is connected tissue related to different organs such as kidneys, liver, heart, and blood vessels.

Skin with the subcutaneous tissue is about 10 kg, taking about 16-17% of body weight. Functions of the skin are Barrier function, protection from impact, infection, and dehydration, Synthesis, Thermoregulation, skin sensation, excretion, and absorption. For instance, one example is Epidemic functions as the skin barrier by having the cell called Langerhans cell, an antigen-presenting immune cell of the skin.

Epidermis (an external layer of skin containing keratinocyte and melanocyte cells) for skin barrier or protection, including Keratinocytes, Melanocytes, and Langerhans cells. Dermis (an internal layer of skin containing fibroblast cells and cellular matrix) regulating body temperature or skin sensation, including Fibroblasts.

Hypodermis (an internal fat layer of skin containing adipocytes) for thermal insulation and absorption of fat, including Adipocytes.

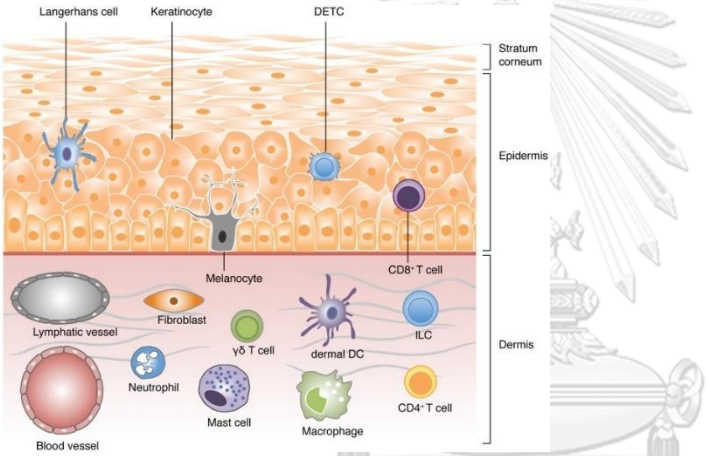


Figure 4 Cells in skin [21]

2.4 Skin conditions and treatments

The following various diseases, literature review, and analysis of various data summary: 1. Dermatitis: Atopic dermatitis; Seborrheic dermatitis; Contact dermatitis. 2. Viral skin diseases: Wart; Molluscum contagious. 3. Fungal skin diseases; Tinea capitis; Other fungal skin infections. 4. Bacterial skin diseases: Cellulitis; Pyoderma; Impetigo; Abscess and other bacterial skin diseases. 5. Melanoma. 6. Non-melanoma skin cancers. 7.

Carcinoma in situ. 8. Other skin and subcutaneous diseases. 9. Pruritus. 10. Urticaria. 11. Decubitus ulcer. 12. Acne vulgaris. 13. Psoriasis. 14. Alopecia areata. 15. Scabies [22].

Three skin problems, fungal skin diseases, other skin, subcutaneous diseases, and acne were the top ten most common diseases globally in 2010, and eight were in the top 50 worldwide prevalent diseases in 2010. The five skin problems are itching, Eczema, impetigo, scabies, and molluscum contagiosum[23].

The pathogeneses for the skin conditions are various one another.

For instance, Tumor necrosis factor (TNF)-α has been identified as a critical cytokine mediating cutaneous inflammation in psoriasis pathogenesis [24].

Some patients with seborrheic dermatitis generally have nervous system problems, nervous system hypertension problems, microbes, or skin barrier problems. It is widespread with Candida and Malassezia infections. In addition, patients with seborrheic dermatitis often have Malassezia pityriasis on the skin surface [28-30].

Atopic dermatitis is a powerful genetic predisposition and genetic influence. However, at the same time, there are different changes in the immune system; for example, resistant generation towards T cell, T-helper 2 is in this initiation of inflammatory processes in atopic dermatitis. There is consequent production of immunoglobulin E [25-27].

The mechanisms behind Eczema could be summarized as three different Eczema types: Acute Eczema, Subacute Eczema, and Chronic Eczema.

For acute Eczema, the reaction is very typical, and in some different situations, for example, when we talk about acute inflammation, exudation and itching and very intense itching are typical. Acute inflammation may occur in other parts of the body. It often occurs in parts in contact with water, contact with plants such as ivy plants or phytophotodermatitis, or contact with certain kinds of chemical components. However, at the same time, pay attention to the difference between scabies, stasis dermatitis, and other diseases. Acute Eczema is also common in patients with vascular problems. In other cases, it may be caused by contact with different gaskets of Tableware, specific cream or emollient ingredients, or certain shampoos.

For subacute Eczema, the inflammatory reaction is different from acute Eczema because it is a typical subacute inflammatory reaction, such as itching, redness, or some patches on dehydrated skin (such as scaling). For subacute inflammation caused by Eczema, we can see diseases such as scabies, fungal infections, bacterial infections because subacute inflammation like Eczema may be a complication of this infection. At the same time, it may be patients with atopic dermatitis, especially atopic dermatitis in childhood. For example, it may be patients with leg stasis, very dry legs in winter, and some contact allergy or irritant contact dermatitis. This is why subacute eczema inflammation often occurs in our dermatological practice. Typically, there are no vesicles, but they must be present in some cases. However, the typical situation is the redness and dryness of the skin.

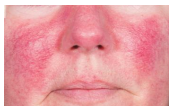
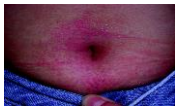
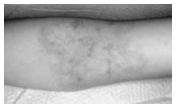
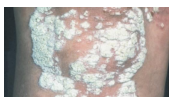
Chronic Eczema, reaction to chronic Eczema is characterized not only by the itching and redness of the skin but also by the thickness of the skin, which is called skin lichenification. This skin disease usually occurs due to severe chronic itching diseases such as atopic dermatitis, chronic contact allergic dermatitis, or chronic irritant dermatitis on the skin, especially specific occupational dermatitis. It may also be habitual, such as long-term friction, due to chronic infections like mycosis. Alternatively, patients who previously suffered from atopic dermatitis are also prone to the disease [31].

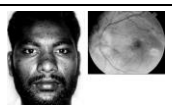
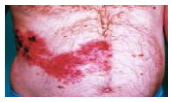
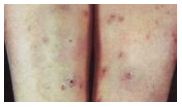
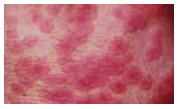
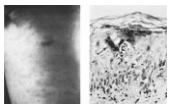
The acne is caused by: increased sebum secretion, excessive proliferation of keratinocytes in the sebaceous sac, inflammation, and colonization of Propionibacterium acnes (Keratobacterium acnes) bacteria [32, 33].

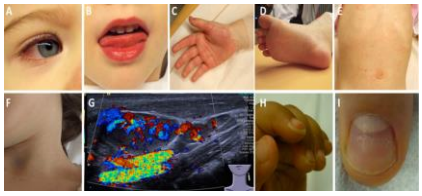
Vitiligo has some theories of pathogenesis. For example, it is caused by immunological theories and specific changes in the structure of pigment cells. Pigmented cells may cause melanin production, and the surrounding keratinocytes are responsible for cell formation. When there is a problem with melanocytes, the transfer of melanocytes to keratinocytes will produce different vitiligo types [34].

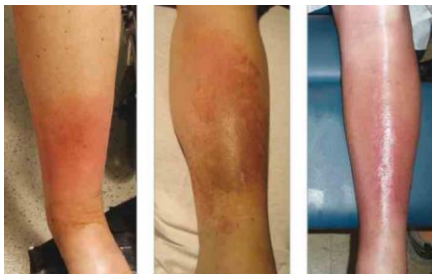
Table 1 Common Skin Conditions

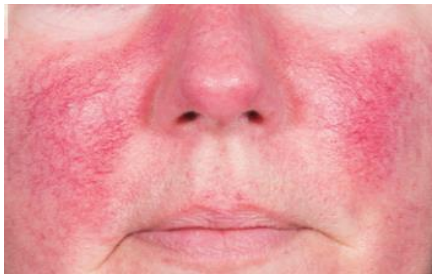
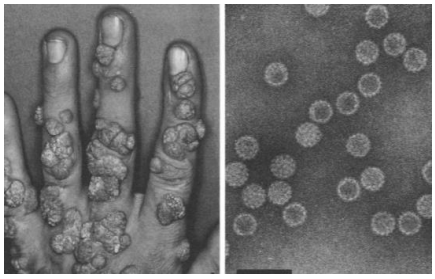
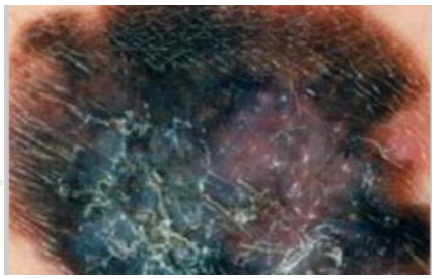
No.	Symptom	Description	pictures

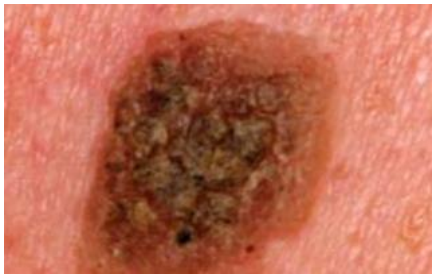
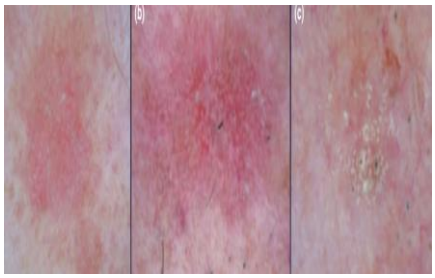
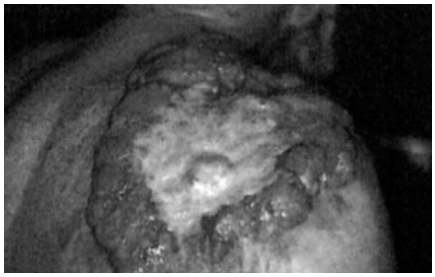
1	Different kind of rashes	All changes in the appearance of the skin are called rashes. Most skin rashes are due to skin irritation. Others are caused by medicine.	 Flea bites [35]  Fifth disease [36]  Rosacea [37]  Impetigo [38]  Ringworm [39]  Contact Dermatitis [40]  Allergic eczema [41]  Hand, foot, and mouth disease [42]  Diaper rash [43]  Eczema [44]  Psoriasis [45]

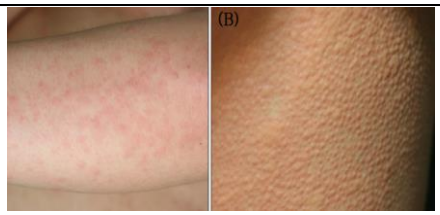
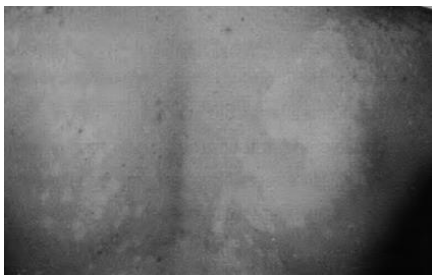
			 Chicken pox  Systemic lupus erythematosus (SLE) [46]  Shingles [47]  Cellulitis [48]  Drug allergy [49]  Scabies [50]  Measles [51]  Tick bite [52]  Seborrheic eczema [53]  Scarlet fever [54]

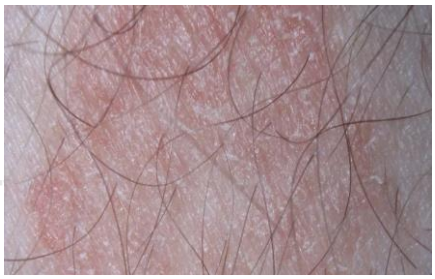
			 Kawasaki disease [55]
2	Dermatitis	A term for all kinds of Skin inflammation. Atopic dermatitis/eczema commonly be the major type.	 [56]
3	Eczema	Dermatitis, leading to a rash. Commonly caused by an overactive immune system	 [57]
4	Psoriasis	Skin cells grow almost ten times faster than normal. Make the skin accumulate into uneven red patches covering the white scales.	 [45]

5	Dandruff	Excessive peeling of scalp skin Non-infectious, generally not serious disease.	 [58]
6	Acne	Hair follicle cells are blocked by oil and dead skin cells. It causes whiteheads, blackheads, or acne.	 [59]
7	Cellulitis	Bacterial infection of the lining of the skin. Significantly affect the dermis and subcutaneous fat.	 [60]
8	Skin abscess	A lump inside or below the surface of the skin. It was filled with pus caused by bacterial infection.	 [61]

9	Rosacea	The face is red, and blood vessels are visible. May produce small, red, pus-filled bumps. Symptoms may go on for weeks to months and then disappear for a while.	 Rosacea [37]
10	Warts	Small, rough, hard, and similar in color to the rest of the skin.	 [62]
11	Melanoma	Malignant melanoma, a type of skin cancer, evolves from the pigment-producing cells of melanocytes.	 [63]
12	Basal cell carcinoma	Skin cancers that evolve from basal cells generally appear as slightly transparent bumps on the skin.	 [64]

13	Seborrheic keratosis	A non-cancerous skin growth due to age. The general color is tan, black, or light tan. The surface is waxy, scaly shaped, and slightly raised, and generally distributed on the head, neck, chest, or back.	 [65]
14	Actinic keratosis	Long-term sun exposure forms rough, scaly patches. It has the risk of developing skin cancer called squamous cell carcinoma in the possibility of 5% to 10%.	 [66]
15	Squamous cell carcinoma	SCC occurs when DNA damage from exposure to ultraviolet radiation or other damaging agents triggers abnormal changes in the squamous cells.	 [67]

16	Herpes simplex	The cause is the herpes viruses HSV-1 and HSV-2, which cause periodic blisters or skin lesions on or near the lips or genitals.	 [68]
17	Hives	They are rapidly developing raised, red, itchy patches on the skin. Usually, the cause is an allergic reaction.	 [69]
18	Tinea versicolor	A benign fungal skin infection that will later develop pale hypopigmentation on the skin.	 [70]
19	Viral exantham	Viral infection causes a red rash and invades large areas of skin. They are commonly seen in children.	 [71]

20	Shingles (herpes zoster)	The chickenpox virus causes a rash on one side of the body, which makes it painful.	 [72]
21	Scabies	The tiny mites that penetrate the skin can cause scabies. The typical symptoms are a reticulated rash on the fingers, wrists, elbows and buttocks, and severe itching.	 [50]
22	Ringworm	Fungal skin infection (tinea)	 [39]

Common Skin Treatments

1. Corticosteroids (steroids): drugs that reduce the activity of the immune system, topical steroids are the most commonly used.

2. Antibiotics: Cellulitis and other skin infections.

3. Antiviral drugs: inhibit the activity of the herpes virus and relieve symptoms.

4. Anti-fungal medicine: topical ointment. Sometimes oral medications are needed.

5. Anti-histamines: oral or topical medication.

6. Skin surgery: Most skin cancers need to be removed by surgery.

7. Immunomodulators: Change the immune system's activity and improve psoriasis or other forms of dermatitis.

8. Skin moisturizer (emollient): Dry skin is usually prone to inflammation and itching. Relieves the symptoms of many skin conditions.

CHAPTER III

METHODOLOGY

This study focused on the specification and scientific information of medicinal plants used in Moh Phon's traditional Thai formularies only for skin conditions. The methods of the study were be described, including three steps as follow.

3.1 Collecting of Moh Phon's Thai traditional medicine formularies

Moh Phon's traditional Thai medicine formularies collected from the second edition of Moh Phon’s Thai Traditional Medicine Formulary. After collecting, the remedies for skin conditions were screened by system analysis and selected to analyze further medicinal plants based on literature reviews searching for essential information and scientific information.

3.2 Explanation and restoration of medicinal plants used for skin conditions in Moh Phon's Thai traditional medicine formularies

- List medicinal plants to identify with the authoritative expert Nijsiri Ruangrungsi from College of Public Health Sciences, Chulalongkorn University, Thailand, in recogonizing the medicinal plants' species used in Moh Phon's Thai traditional medicine formularies for skin conditions
- Provide plant description and picture of the medicinal plant species

- Investigate their efficacy based on reviews of the literature in correlation with biological and pharmacological activities and toxicity property.

All medicinal plants in each remedy were searched by their scientific name, vernacular name, and local name. The scientific name written in Italic when genus name written in capital letters and species name written in lower case, synonym, common name, local name, distribution, ethnomedical uses, and plant picture. Furthermore, other scientific information, including their active constituent, biological and pharmacological activities, and toxicity property, were investigated based on literature reviews by search through databases, such as Pubmed, Science Direct, Medline, and Google Scholar.

3.3 Data Analysis to analyze frequent plants and families of medicinal plants used for skin conditions in Moh Phon's Thai traditional medicine formularies

Data of all medicinal plants for skin conditions in Moh Phon's traditional Thai formularies were analyzed on

(1) Composition of recipes,

(2) Plants used to treat the skin conditions in Moh Phon's prescriptions according to 32 skin conditions,

(3) Lists of plant families and species used along with their frequencies,

(4) Plant parts involved in recipes,

(5) Recipe preparation methods,

(6) Methods of application for recipes. Based on the literature review of previous reports, the frequently used plant species were also analyzed for their biological activities, pharmacological properties, and toxicities.

(7) Summerizing and conclusion.

Analysis method consists process as the below:

Flow Diagram for Data Analysis to analyze frequent plants and families

3.4 Ethical consideration

This study not be applied for ethical consideration because of no methodologies related to animals or humans.

3.5 Limited of the study

This study has limitations on the ancient Thai language barriers, and local names of the plants usually differ from each other. This reason cause difficulties in searching for the correct scientific names for herbal plants.

3.6 Benefits of the study

The study reveal the importance of several frequent plant species used to treat skin conditions in Moh Phon's Thai traditional medicine formularies.

This study provide scientific information on plant species used in Moh Phon's Thai traditional medicine formularies for skin conditions.

The scientific information on plant species support the evidence of the therapeutic properties for curing skin diseases.

The medicinal plant species used for skin conditions in Moh Phon's traditional Thai medicine formularies were correctly identified for further studies.

This study promote the preservation of species and ethnomedical knowledge of medicinal plant in Thailand.

CHAPTER IV

RESULTS

The remedies in Moh Phon's formulary for skin diseases and conditions were investigated and the results of this study including remedies, medicinal plants used, the most frequent botanical family, the frequent medicinal plants, scientific information of medicinal plants such as pharmacological and toxicological properties are as follows.

4.1 Skin diseases/conditions in Moh Phon's Traditional Thai Medicine formulary

Twenty-six skin diseases/ conditions were found in Moh Phon's traditional Thai medicine formulary. Cause and symptom of each skin disease or condition was briftly explain in Table 2. There were various causes of these skin diseases including virus, fungus, bacteria, physical damages, parasites, poisons and animals.

Table 2 Skin diseases in Moh Phon's traditional Thai medicine formulary

Skin disease/ condition	Cause	Symptom
1. Herpes simplex	Herpes simplex virus 1 and herpes simplex virus 2 (HSV-1 and HSV-2)[83]	Having a cold sore or fever blister

2. Herpes zoster	Varicella zoster virus (VZV)[47]. which also causes chickenpox	Having cold sores and genital herpes.
3. Eczema	Herpes simplex 1 virus or "oral herpes"[84]	Inflammatory skin condition that causes itchiness, dry skin, rashes, scaly patches, blisters and skin infections. Itchy skin is the most common symptom of eczema.
4. Erysipelas	Bacteria called beta-hemolytic streptococcal [85]	Erysipelas predominantly affects the skin of the lower limbs, but when it involves the face, it can have a characteristic butterfly distribution on the cheeks and across the bridge of the nose.
5. Rash	Toxic/poison; Mosquito/midges; etc.	Swelling, redness, itching burning or blisters, and severe irritation
6. Animal venom from biting	Poisonous animals (or insects)	Puncture marks at the wound

		Redness, swelling, bruising, bleeding, or blistering around the bite Severe pain and tenderness at the site of the bite Nausea, vomiting, or diarrhea Labored breathing (in extreme cases, breathing may stop altogether) Rapid heart rate, weak pulse, low blood pressure Disturbed vision Metallic, mint, or rubber taste in the mouth Increased salivation and sweating Numbness or tingling around face and/or limbs Muscle twitching
7. Itch	Dry skin, allergic, insect bite, disease, etc.	Itchy skin can affect small areas, such as scalp, arm or

		leg, or whole body and can occur without any other noticeable changes on the skin. It may be associated with redness, scratch marks, bumps, spots or blisters, dry/cracked skin, leathery or scaly patches
8. Urticaria	Allergic reaction	Hives are raised red bumps (welts) or splotches on the skin. They are a type of swelling on the surface of your skin. Itchy welts
9. Tinea versicolor or Pityriasis versicolor	Fungal infection of the skin, eg. Pityrosporum orbiculare [87]	The fungus interferes with the normal pigmentation of the skin, resulting in small, discolored patches.
10. Pityriasis alba	Had atopic dermatitis before (young age, dark skin phototype, overexposure sunlight, microbiologic factors (Staphylococcus aureus,	The most common sign of pityriasis alba is the skin patches that show up on

	Propionibacterium acnes) and parasitic factors (Ascaris) as potential pathogenic elements, etc.[88]) or severe food allergies	your face, neck, arms, shoulders, or belly.
11. Ring worm (Tenea circinato)	Fungal infection of the skin, eg. Trichophyton, Epidermophyton, Microsporum, [86][89]; - Tinea pedis, (athlete's foot); - Tinea cruris, (jock itch) - Tinea capitis (ringworm).	1.Tinea pedis, (athlete's foot): An itchy, stinging, burning rash on the skin on one or both of your feet. 2.Tinea cruris, (jock itch): Jock itch usually begins with a reddened area of skin in the crease in the groin. It often spreads to the upper thigh in a half-moon shape. The rash may be ring-shaped and bordered with a line of small blisters. 3.Tinea capitis (ringworm): Ring-shaped rash that is itchy, scaly and slightly raised.

12. Impetigo	Fungal infection, warm, humid climate, have diabetes, undergoing dialysis, HIV, have skin conditions, have a sunburn or other burns, have itchy infections such as lice, scabies, herpes simplex, or chickenpox, have insect bites or poison ivy, play contact sports	Impetigo starts as a red, itchy sore. As it heals, a crusty, yellow or “honey-colored” scab forms over the sore.
13. Vitiligo	Unknown, possibly genetic susceptibility	Patchy loss of skin color, which usually first appears on the hands, face, and areas around body openings and the genitals. Premature whitening or graying of the hair on your scalp, eyelashes, eyebrows or beard. Loss of color in the tissues that line the inside of the

		mouth and nose (mucous membranes)
14. Pox/abscess	Most abscesses are caused by a bacterial infection.	When bacteria enter your body, your immune system sends infection-fighting white blood cells to the affected area. As the white blood cells attack the bacteria, some nearby tissue dies, creating a hole which then fills with pus to form an abscess.
15. Scabies	Mite Sarcoptes scabiei	Itching, often severe and usually worse at night. Thin, irregular burrow tracks made up of tiny blisters or bumps on your skin. The burrows or tracks typically appear in folds of skin. Though almost any part of the body may be involved.

16. Warts	Human papilloma virus	The infection causes rough, skin-colored bumps to form on the skin.
17. Vaginal itching	irritating substances, infections, or menopause skin disorders or sexually transmitted diseases (STDs) stress or vulvar cancer	Vaginal Itching with irritating.
18. Scaling skin	Mistaken for dry, sensitive skin	Scaly patches, red skin and stubborn dandruff.
19. Tinea crusis	Fungal infection of the skin, eg. Trichophyton, Epidermophyton, Microsporum	Jock itch usually begins with a reddened area of skin in the crease in the groin. It often spreads to the upper thigh in a half-moon shape. The rash may be ring-shaped and bordered with a line of small blisters.
20. Fresh wound	Physical damage	Warm skin around the wound. Yellow or green discharge coming from the
21. Chronic wound	Physical damage/ other diseases such as diabete, etc.	

		wound. Sometimes wound giving off an unpleasant odor. Red streaks on the skin around the wound. Fever and chills. Aches and pains. Nausea. Vomiting.
22. Blister	Forceful rubbing (friction), burning, freezing, chemical exposure or infection	Fluid-filled swelling occurring within or just under the skin
23. Tetanus	Infection caused by Clostridium tetani	Tetanus (Lockjaw) is a serious bacterial infection that damages muscles, nerves, and respiratory function.
24. Cracked skin on palm and sole feet	Dry or irritated	Skin is dry or irritated.
25. Rotting toe	An injury	Pain. pressure. redness or change in skin color. swelling. oozing. a bad smell. feeling hot to touch.
26. Athlete's foot or Tinea pedis	Another medical condition A microorganism Toenails naturally grow Bacterial coagulase-negative staphylococcal, and Corynebacterium	

	species. Usually with Fungal infections with Acremonium species [90]. Trichophyton mentagrophytes (52.8%), Epidermophyton floccosum (13.9%), Neoscytalidium dimidiatum (11.1%), Trichophyton rubrum (11.1%), Trichophyton tonsurans (2.8%) and Candida spp. (8.3%) [91] [92].	

4.2 Remedies for treatment of skin diseases/ conditions in Moh Phon's traditional Thai medicine formulary

Seventy-eight remedies in Moh Phon's traditional Thai medicine formulary were used to treat skin diseases or conditions such as herpes simplex, herpes zoster, eczema, erysipelas, rash, itchy, urticaria, Tinea versicolor, ring worm, warts, scabies and wound (Table 3). In addition, the detail of each remedy including the plant's scientific name, family, plant part used, non plant element, method of preparation and method of administration are also shown in Table 3.

Beside plant materials, non plant materials were also found in some remedies such as animal material (rabbit bone, honey bee, cow and goose stool, nautilus shell, red ant etc.), mineral material (salt, red sulfur, limestone etc.) and other materials (used net, ethyl alcohol, rain water etc.).

Table 3

Table 3 Remedies for treatment of skin diseases/conditions in Moh Phon's traditional Thai medicine formulary

Remedies for treatment of skin disease/conditions		Plant element			Non plant element	Method of preparation	Method of administration
		Scientific name	Family	Part use			
1. Remedy for herpes simplex/herpes zoster/eczema (ยารักษาโรคเริม/งูสวัด/ขยุ้มตีนหมา)	Remedy 1.1	*Lagenaria siceraria* (Molina) Standl.	Cucurbitaceae	Leaf (Fresh)	cow stool (dry)	Pound	Poultice
	Remedy 1.2	*Cocos nucifera* L.	Arecaceae	Fruit shell (New)	net (used), water (dirty)	Burn (ashes)	Apply
	Remedy 1.3	-	-	-	nautilus shell (died), rain water	Rasp	Apply
	Remedy 1.4	-	-	-	Goose stool, ethyl alcohol	Burn	Apply
	Remedy 1.5	*Gonostegia pentandra* (Roxb.) Miq.	Urticaceae	Not mentioned	Calcium Hydroxide (Limewater)	Rasp	Apply
	Remedy 1.6	*Heliotropium indicum* L.	Boraginaceae	Not mentioned	water (dirty)	Pound	Apply
	Remedy 1.7	*Clinacanthus nutans* (Burm.f.) Lindau	Acanthaceae	Leaf	Ethyl alcohol	Pound	Apply
	Remedy 1.8	*Cyathula prostrata* (L.) Blume	Amaranthaceae	Top	Ashes (wood), water (dirty)	Pound	Apply
	Remedy 1.9	-	-	-	Rabbit bone, ethyl alcohol	Rasp	Apply
	Remedy 1.10	-	-	-	Red sulfur, ethyl alcohol	Pound	Apply
	Remedy 1.11	*Azima sarmentosa* (Blume) Benth. & Hook.f.	Salvadoraceae	Root	Ethyl alcohol	Pound	Apply

Table 3 Remedies for treatment of skin diseases/conditions in Moh Phon's traditional Thai medicine formulary (cont.)

2. Remedy for erysipelas (ยารักษาโรคไฟลามทุ่ง)	Remedy 2.1	*Ipomoea aquatia* Forsk	Convolvulaceae	Leaf	Calcium carbonate (Marl/ Limestone)	Pound	Apply
3. Remedy for rash (ยารักษาโรคเม็ดผื่นคันตามตัว)	Remedy 3.1	*Centella asiatica* (L.) Urban	Umbelliferae	Aerial part	Water	Decoction	Apply
	Remedy 3.2	*Acacia concinna* (Willd.) DC.	Fabaceae/ Leguminosae	Leaf	Water	Decoction	Apply
4. Remedy for rash in children (ยารักษาโรคเม็ดผื่นคันในเด็ก)	Remedy 4.1	*Momordica charantia* L.	Cucurbitaceae	Fruit	Calcium carbonate (Marl/ Limestone)	Crush	Poultice
5. Remedy for rash caused by various toxicity/poison exposure (ยารักษาโรคเม็ดผื่นคันเพราะถูกพิษต่างๆ)	Remedy 5.1	*Coccinia grandis* (L.) Voigt.	Cucurbitaceae	Leaf (Fresh)	-	Crumble	Apply
6. Remedy for rash caused by mosquito and midges (ยารักษาโรคเม็ดผื่นคันเพราะยุงและริ้นกัด)	Remedy 6.1	*Curcuma longa* L.	Zingiberaceae	Rhizome		Pound and digestion	Apply
		Nicotiana tabacum L.	Solanaceae	Leaf			
		Cocos nucifera L.	Arecaceae	Coconut oil(furit)			
7. Remedy for animal venom from biting (ยาแก้พิษสัตว์กัดต่อย)	Remedy 7.1	*Citrus aurantifolia* Swing.	Rutaceae	Fruit (Fresh juice)	Monosodium glutamte	Squeeze	Apply
	Remedy 7.2	*Allium ascalanicum* L.	Alliaceae	Bulb	-	Crush	Apply
	Remedy 7.3	*Allium ascalanicum* L.	Alliaceae	Bulb		Pound	Apply
		Tamarindus indica L.	Fabaceae/Leguminosae	Fruit			
	Remedy 7.4	*Capsicum frutescens* Linn.	Solanaceae	Fruit	-	Pound	Poultice

	Remedy 7.5	-	-	-	Ammonia solution	-	Apply
	Remedy 7.6	*Uraria crinita* (L.) Desv. ex DC.	Fabaceae/Leguminosae	Stem and leaf	Ethyl alcohol	Pound	Poultice
	Remedy 7.7	*Citrus aurantifolia* Swing.	Rutaceae	Fruit (Juice)	Fingernail, lid of an earthen pot	Rasp	Apply
	Remedy 7.8	*Carica papaya* L.	Caricaceae	Leaf (Fresh)	Calcium Hydroxide (Red lime)	Pound	Poultice
8. Remedy for rash (ยารักษาโรคผื่นต่างๆ)	Remedy 8.1	*Zingiber montanum* Roxb.	Zingiberaceae	Rhizome	Sodium chloride, Calcium Hydroxide (Red lime)	Decoction	Apply
		Syzygium aromaticum (L.) Merr. & L.M. Perry	Myrtaceae	Flower			
		Cinnamomum camphora (L.) J. Presl.	Lauraceae	Wood (stem)			
		Hopea odorata Roxb.	Dipterocarpaceae	Wood (stem)			
		Cocos nucifera L.	Arecaceae	Oil (fruit)			
		Sesamum indicum L.	Pedaliaceae	Oil (seed)			
9. Remedy for itchy (ยารักษาโรคคัน)	Remedy 9.1	*Citrus maxima* (Burm.) Merr.	Rutaceae	Peel (fruit) (Dry)	Water	Decoction	Shower
10. Remedy for urticaria (ยารักษาโรคลมพิษ)	Remedy 10.1	*Barleria lupulina* Lindl.	Acanthaceae	Leaf	Calcium carbonate (Marl/ Limestone), Water	Pound	Apply
	Remedy 10.2	*Piper betle* Linn.	Piperaceae	Leaf (Fresh)	Ethyl alcohol	Pound	Apply
	Remedy 10.3	*Alpinia galanga* (L.) Willd.	Zingeberaceae	Rhizome	Ethyl alcohol	Pound	Apply

Table 3 Remedies for treatment of skin diseases/conditions in Moh Phon's traditional Thai medicine formulary (cont.)

	Remedy 10.4	*Apium graveolens* L.	Apiaceae/ Umbelliferae	Leaf	Water	Decoction/ Pound	Drink/ shower/apply
11. Remedy for uticaria and rash (ยารักษาโรคลมพิษและโรคผื่นคัน)	Remedy 11.1	-	-	-	Plant/tree (Ant nest), water	Decoction	Shower
12. Remedy for Tinea versicolor or Pityriasis versicolor (ยารักษาโรคเกลื้อน)	Remedy 12.1	*Mimusops elengi* Linn.	Sapotuceae	Leaf (Fresh)	Sulfur, ethyl alcohol	Pound	Apply
	Remedy 12.2	*Areca catechu* L.	Arecaceae	Fruit (Fresh)	-	Cut	Apply
	Remedy 12.3	-	-	-	Borax, rain water	Mixed	Apply
	Remedy 12.4	*Camellia sinensis* (L.) kuntze	Theaceae	Leaf	Borax, rain water	Decoction	Apply
	Remedy 12.5	-	-	-	Red ant (Living) (*Oecophylla smaragdina*)	Crush	Apply
	Remedy 12.6	*Allium sativum* L.	Alliaceae	Bulb	-	Pound	Apply
	Remedy 12.7	*Cymbopogon citratus* (DC) Stapf.	Gramineae/ Poaceae	Stem	Sodium chloride (Salt)	Pound	Apply
	Remedy 12.8	*Citrus aurantifolia* Swing.	Rutaceae	Fruit (Juice)	Sulfur powder	Mixed	Apply
	Remedy 12.9	*Solanum melongena* Linn.	Solanaceae	Fruit (Fresh)	Sulfur powder	Cut	Poultice
13. Remedy for Tinea versicolor (ยารักษาโรคเกลื้อนดอกหมาก)	Remedy 13.1	*Indigofera tinctoria* L.	Fabaceae/legumin osae	leaf (Indigo)	Acetic acid (Vinegar)	Mixed	Apply

14. Remedy for Pityriasis alba (ยารักษาโรคเกลื้อนน้ำนม)	Remedy 14.1	*Ocimum africanum* Lour	Lamiaceae/ Labiatae	Leaf	Milk (Mother's milk)	Crush	Apply
15. Remedy for Tenea circinato or ring worm (ยารักษาโรคกลาก)	Remedy 15.1	*Rhinacanthus nasutus* (Linn.) Kurz.	Acanthaceae	Leaf	Kerosene	Pound	Apply
	Remedy 15.2	*Cassia alata* (L.) Roxb.	Fabaceae /Leguminosae	Leaf	Sodium chloride (Salt)	Pound	Apply
		Allium sativum L.	Alliaceae	Bulb			
	Remedy 15.3	*Curcuma longa* L.	Zingiberaceae	Rhizome (Powder)	Rain water	Mixed	Apply
	Remedy 15.4	*Cassia alata* (L.) Roxb.	Fabaceae /Leguminosae	Leaf (Fresh)	-	Chew	Apply
	Remedy 15.5	*Cassia alata* (L.) Roxb.	Fabaceae /Leguminosae	Leaf (Fresh)	-	Pound	Apply
16. Remedy for impetigo/ring worm (ยารักษาโรคพุพอง/ขี้กลากเหล็ก)	Remedy 16.1	*Curcuma longa* L.	Zingiberaceae	Rhizome (Powder)	Copper (II) sulfate powder	Mixed	Apply
		Cocos nucifera L.	Arecaceae	Coconut milk (fruit)			
		Garcinia hanburyi Hook F.	Clusiaceae	Gum (stem)			
17. Remedy for vitiligo (ยารักษาโรคด่าง)	Remedy 17.1	*Capsicum annuum* Linn.	Solanaceae	Fruit	Sodium chloride, shrimp paste, fish sauce, palm sugar	Decoction	Shower-steam
		Cymbopogon citratus (DC) Stapf.	Gramineae/Poaceae	Stem			
		Allium ascalanicum L.	Alliaceae	Bulb			
		Allium sativum L.	Alliaceae	Bulb			
		Piper nigrum L.	Piperaceae	Fruit			

Table 3 Remedies for treatment of skin diseases/conditions in Moh Phon's traditional Thai medicine formulary (cont.)

		Cassia alata (L.) Roxb.	Fabaceae	Leaf			
		Citrus hystrix DC.	Rutaceae /Leguminosae	Leaf			
		Alpinia galanga (L.) Willd.	Zingeberaceae	Rhizome			
		Nicotiana tabacum L.	Solanaceae	Leaf			
		Syzygium aromaticum (L.) Merr. & L.M. Perry	Myrtaceae	Flower			
		Cocos nucifera L.	Arecaceae	Oil (fruit)			
	Remedy 19.4	*Cocos nucifera* L.	Arecaceae	Shell	-	Burn	Apply
		Coriandrum sativum L.	Apiaceae/ Umbelliferae	Root, Fruit (fruit) (oil)			
20. Remedy for warts (ยารักษาโรคหูด)	Remedy 20.1	*Sesamum indicum* L.	Pedaliaceae	Leaf	Urine	Pound	Poultice
		Cuminum cyminum L.	Apiaceae/ Umbelliferae	Fruit (Fresh) (Dry)			
	Remedy 20.2	*Ocimum tenuiflorum* L.	Lamiaceae/ Labiatae	Leaf	-	Crush	Apply
		Amomum krervanh Pierre ex Gagnep	Zingiberaceae	Fruit			
	Remedy 20.3	*Euphorbia tirucalli* L.	Euphorbiaceae	Gum/latex	-	Cut	Apply
		Myristica fragrans Houtt.	Myristicaceae	Seed, Flower (Stem)			
		Cinnamomum verum J.	Lauraceae	Bark (stem)			
	Remedy 20.4	*Colocasia esculenta* (L.) Presl. Schott	Araceae	Gum/latex (Stem)	-	Cut	Apply
	Remedy 20.5	*Tamarindus indica* L.	Fabaceae/Legumi -nosae	Fruit - (Juice)	Acid soap, Calcium Hydroxide (Red lime)	Mixed	Poultice
		Cocos nucifera L.	Arecaceae	Coconut milk (fruit)			
21. Remedy for vaginal	Remedy 21.1	*Mallotus nudiflora* (L.)	Euphorbiaceae	Leaf	-	Decoction	Drink
18. Remedy for pox/abscess itching (ยารักษาโรคหัวพิษ/หัว (ยารักษาโรคคันทวารเบา) กามะลอก)	Remedy 18.1	*Allium ascalanicum* L. Kulju&Welzen	Alliaceae	Bulb	-	Pound	Poultice
		Averrhoa bilimbi L.	Oxalidaceae	Fruit			
22. Remedy for scaling skin	Remedy 22.1	*Citrus aurantifolia* Swing.	Rutaceae	Fruit	-	Cut	Apply
19. Remedy for scabies (ยารักษาโรคผิวหนังตกสะเก็ด) (ยารักษาโรคหิด)	Remedy 19.1	*Musa sapientum* L.	Musaceae	Fruit	Sulfur, rice flour	Fried	Eat/ Apply
		Cocos nucifera L.	Arecaceae	Oil (fruit)			
23. Remedy for Tinea crusis (ยารักษาโรคสังคัง)	Remedy 23.1	*Datura metel* L.	Solanaceae	Fruit	-	Mixed and	Apply
	Remedy 19.2	*Cocos nucifera* L.	Arecaceae	Oil (fruit) (Burn and pound)	Dammar, sulfur	Digestion Squeeze	Apply
	Remedy 19.3	*Calotropis gigantean* (L.)	Apocynaceae	Leaf	Sulfur	Pound and	Apply
		Cocos nucifera L.	Arecaceae	Coconut milk (fruit)		digestion	
		Dryand *Nicotiana tabacum* L.	Solanaceae	Leaf			

Table 3 Remedies for treatment of skin diseases/conditions in Moh Phon's traditional Thai medicine formulary (cont.)

Table 3 Remedies for treatment of skin diseases/conditions in Moh Phon's traditional Thai medicine formulary (cont.)

24. Remedy for fresh wound (ยารักษาแผลสด)	Remedy 24.1	-	-	-	Honey bee	-	Apply
	Remedy 24.2	*Dipterocarpus alatus* Roxb.ex G.Don	Dipterocarpaceae	Oil	White sugar	Mixed	Apply
	Remedy 24.3	*Oldenlandia biflora* L.	Rubiaceae	Aerial part	Ethyl alcohol	Pound	Poultice
25. Remedy for fresh wound (ยาสมานแผลสด)	Remedy 25.1	*Centella asiatica* (L.) Urban	Apiaceae/ Umbelliferae	Aerial part	-	Pound	Poultice
26. Remedy for fresh wound and chronic wound (ยารักษาแผลสดและแผลเรื้อรัง)	Remedy 26.1	*Cocos nucifera* L.	Arecaceae	Oil (fruit)	Pure lead	Mixed	Apply
		Piper nigrum L.	Piperaceae	Fruit			
		Allium sativum L.	Alliaceae	Bulb			
	Remedy 26.2	*Tiliacora triandra (Colebr.) Diels*	Menispermaceae	Leaf	-	Chew	Poultice
27. Remedy for blister (ยารักษาแผลพุพอง)	Remedy 27.1	*Garcinia mangostana* L.	Clusiaceae	Peel (fruit)	Lid of an earthen pot, water, Calcium Hydroxide (Limewater)	Rasp	Apply
	Remedy 27.2	*Shorea saimensis* Miq.	Dipterocarpaceae	Leaf (Dry)	Potassium permanganate	Pound	Apply
28. Remedy for tetanus (ยารักษาโรคบาดทะยัก)	Remedy 28.1	-	-	-	Acetic acid (Vinegar)	-	Cover
29. Remedy for cracked skin on hand and feet (ยารักษาฝ่ามือฝ่าเท้าแตก)	Remedy 29.1	*Musa x paradisiaca* L.	Musaceae	Peel (fruit)	-	-	Rub
30. Remedy for thick, hardened layers of skin on (ยารักษาโรคเป็นหน่อที่ฝ่าเท้า)	Remedy 30.1	*Agave sisalana* Perrine	Agaeceae	Ashes (leaf)	Sulfur (yellow), engine oil	Mixed	Apply

31. Remedy for Rotting toes (ยารักษาโรคนิ้วเท้าเปื่อย)	Remedy 31.1	*Garcinia mangostana* L.	Clusiaceae	Peel (fruit) (Dry)	Lid of an earthen pot, Water, *Aluminium* Sulphate (Alum)	Rasp	Poultice
32. Remedy for Athlete's foot or Tinea pedis (ยารักษาโรคน้ำกัดเท้า)	Remedy 32.1	*Citrus aurantifolia* Swing.	Rutaceae	Fruit (Fresh Juice)	-	-	Apply
	Remedy 32.2	*Diospyros mollis* Griff.	Ebenaceae	Fruit	-	Pound	Apply
	Remedy 32.3	-	-	-	Sulfur, Kerosene	Pound and mixed	Apply
	Remedy 32.4	*Spondias pinnata* (L.f.) Kurz	Anacardiaceae	Fruit (Peel off)	-	Cut	Poultice

4.3 Diversity of medicinal used for skin

diseases/ conditions in Moh Phon's traditional Thai medicine formulary

Totally, 66 plant species distributed among 36 families and 57 genera were mentioned for treatment skin diseases/ conditions in Moh Phon's traditional Thai medicine formulary (Table 3). In regard to the numbers of plant species used in the families, Arecaceae (12 plant species; 18%) was the most notable families, followed by Fabaceae/Leguminosae (9 plant species; 14%) and Alliaceae (8 plant species; 12%), as shown in Figure 5.

In this study, the highest frequency of plant species used for treatment skin diseases/ conditions in Moh Phon's traditional Thai medicine formulary was *Cocos nucifera* L. (11%), followed by *Citrus aurantifolia* Swingle (5%), *Allium sativum* L. (4%), *Allium ascalonicum* L. (4%) and *Cassia alata* (L.) Roxb (4%), as shown in Figure 6.

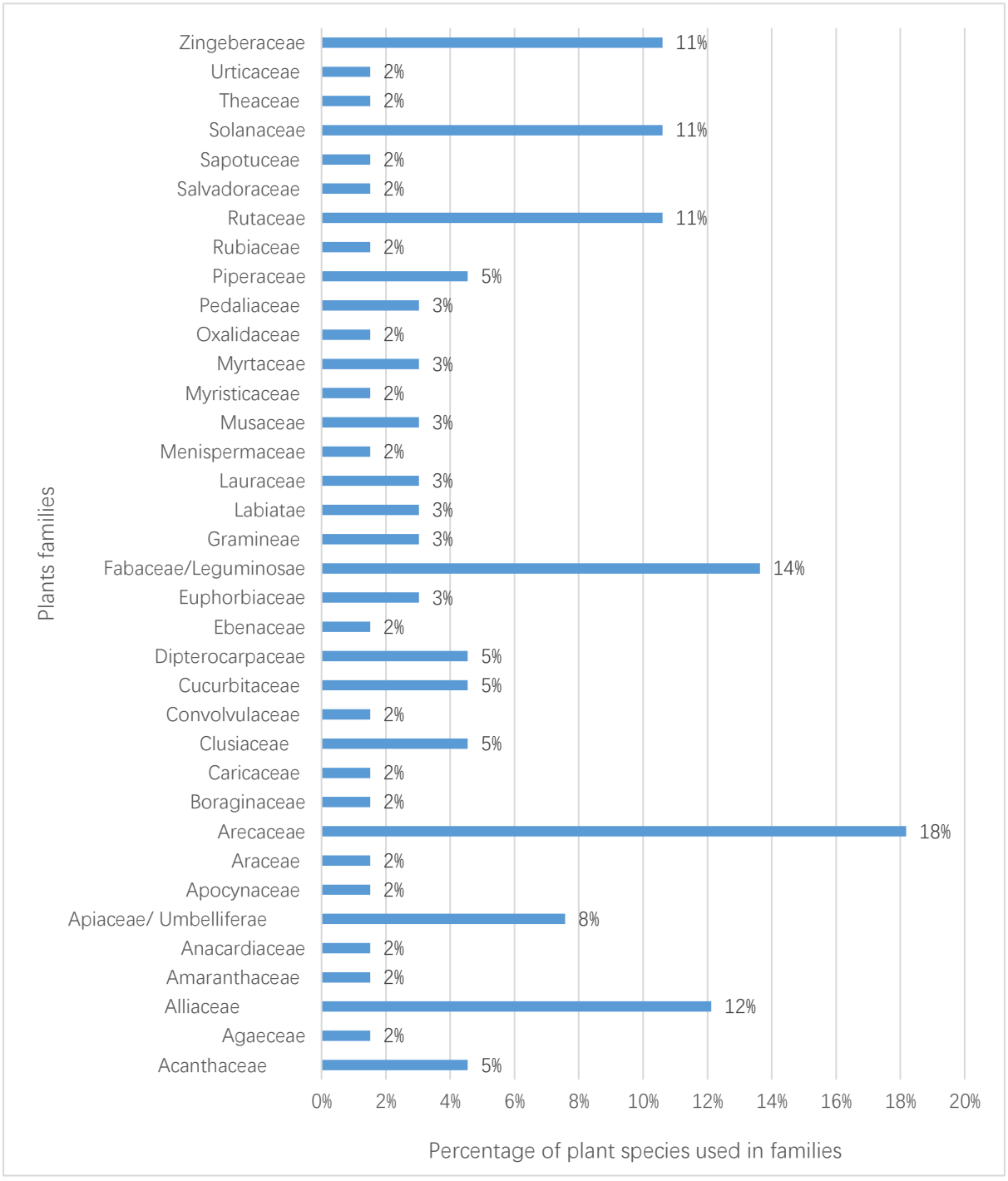


Figure 5 Percentage of plant species used in families

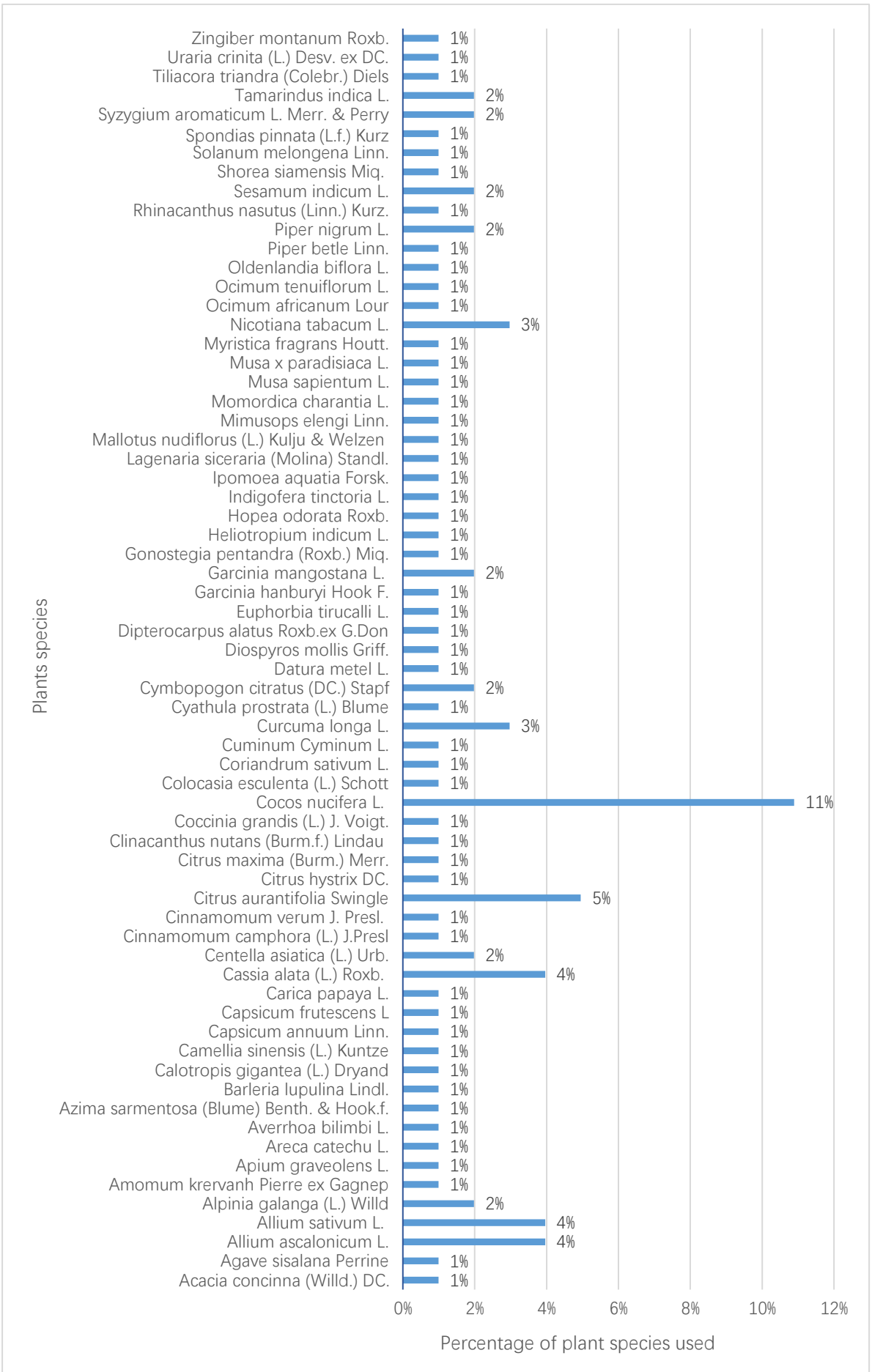

Zingiber montanum Roxb. 1%
Uraria crinita (L.) Desv. ex DC. 1%
Tiliacora triandra (Colebr.) Diels 1%
Tamarindus indica L. 2%
Syzygium aromaticum L. Merr. & Perry 2%
Spondias pinnata (L.f.) Kurz 1%
Solanum melongena Linn. 1%
Shorea siamensis Miq. 1%
Sesamum indicum L. 2%
Rhinacanthus nasutus (Linn.) Kurz. 1%
Piper nigrum L. 2%
Piper betle Linn. 1%
Oldenlandia biflora L. 1%
Ocimum tenuiflorum L. 1%
Ocimum africanum Lour 1%
Nicotiana tabacum L. 3%
Myristica fragrans Houtt. 1%
Musa x paradisiaca L. 1%
Musa sapientum L. 1%
Momordica charantia L. 1%
Mimusops elengi Linn. 1%
Mallotus nudiflorus (L.) Kulju & Welzen 1%
Lagenaria siceraria (Molina) Standl. 1%
Ipomoea aquatia Forsk. 1%
Indigofera tinctoria L. 1%
Hopea odorata Roxb. 1%
Heliotropium indicum L. 1%
Gonostegia pentandra (Roxb.) Miq. 1%
Garcinia mangostana L. 2%
Garcinia hanburyi Hook F. 1%
Euphorbia tirucalli L. 1%
Dipterocarpus alatus Roxb.ex G.Don 1%
Diospyros mollis Griff. 1%
Datura metel L. 1%
Cymbopogon citratus (DC.) Stapf 2%
Cyathula prostrata (L.) Blume 1%
Curcuma longa L. 3%
Cuminum Cyminum L. 1%
Coriandrum sativum L. 1%
Colocasia esculenta (L.) Schott 1%
Cocos nucifera L. 11%
Coccinia grandis (L.) J. Voigt. 1%
Clinacanthus nutans (Burm.f.) Lindau 1%
Citrus maxima (Burm.) Merr. 1%
Citrus hystrix DC. 1%
Citrus aurantifolia Swingle 5%
Cinnamomum verum J. Presl. 1%
Cinnamomum camphora (L.) J.Presl 1%
Centella asiatica (L.) Urb. 2%
Cassia alata (L.) Roxb. 4%
Carica papaya L. 1%
Capsicum frutescens L 1%
Capsicum annuum Linn. 1%
Camellia sinensis (L.) Kuntze 1%
Calotropis gigantea (L.) Dryand 1%
Barleria lupulina Lindl. 1%
Azima sarmentosa (Blume) Benth. & Hook.f. 1%
Averrhoa bilimbi L. 1%
Areca catechu L. 1%
Apium graveolens L. 1%
Amomum krervanh Pierre ex Gagnep 1%
Alpinia galanga (L.) Willd 2%
Allium sativum L. 4%
Allium ascalonicum L. 4%
Agave sisalana Perrine 1%
Acacia concinna (Willd.) DC. 1%
Plants species
0%
2%
4%
6%
8%
10%
12%
Percentage of plant species used

Figure 6 Percentage of plant species used in all remedies

4.4 Plant part used, method of preparation and method of administration

Ten different plant parts used were found in the remedies for skin diseases/ conditions in Moh Phon's traditional Thai medicine formulary. The result in Figure 7 show that fruit was the most frequently used plant part (37%), followed by leaf (30%), stem (9%), bulb (8%), and rhizome (6%).

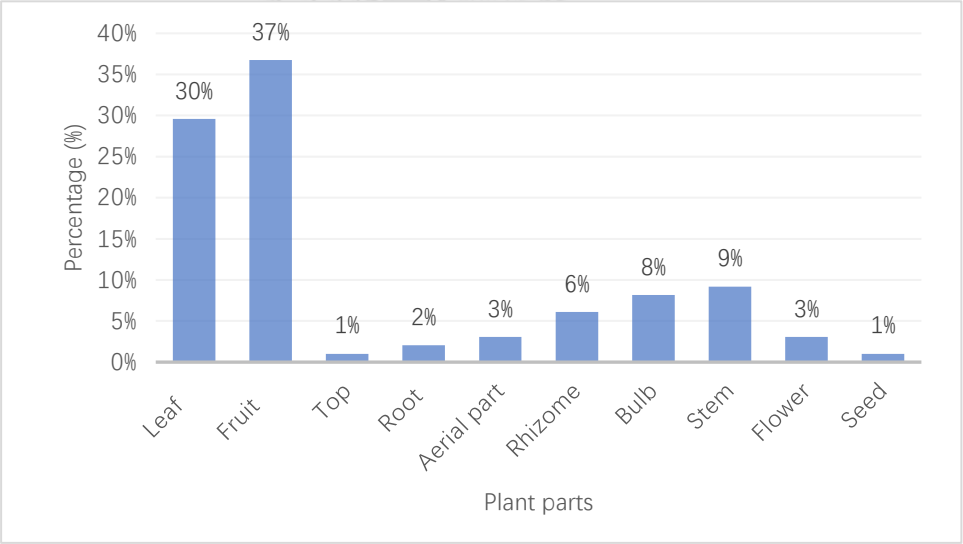


Figure 7 Percentage of plant parts used

Figure 8 showed percentage of remedies preparation methods in Moh Phon's traditional Thai medicine formulary for skin diseases/ conditions. Pound was the most

preferable method of remedies preparation (38%), follow by mixed (14%), decoction (11%), rasp (7%) and crush (6%).

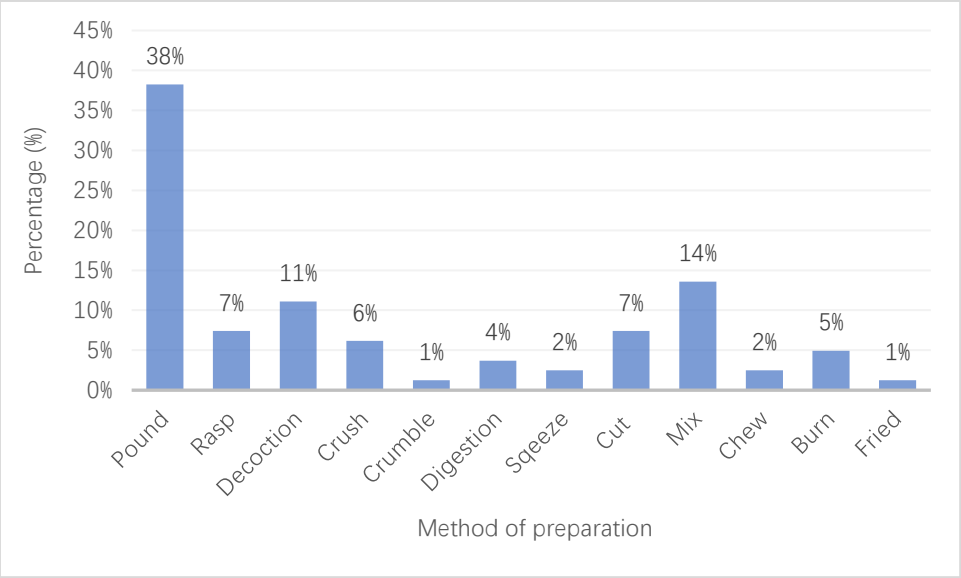
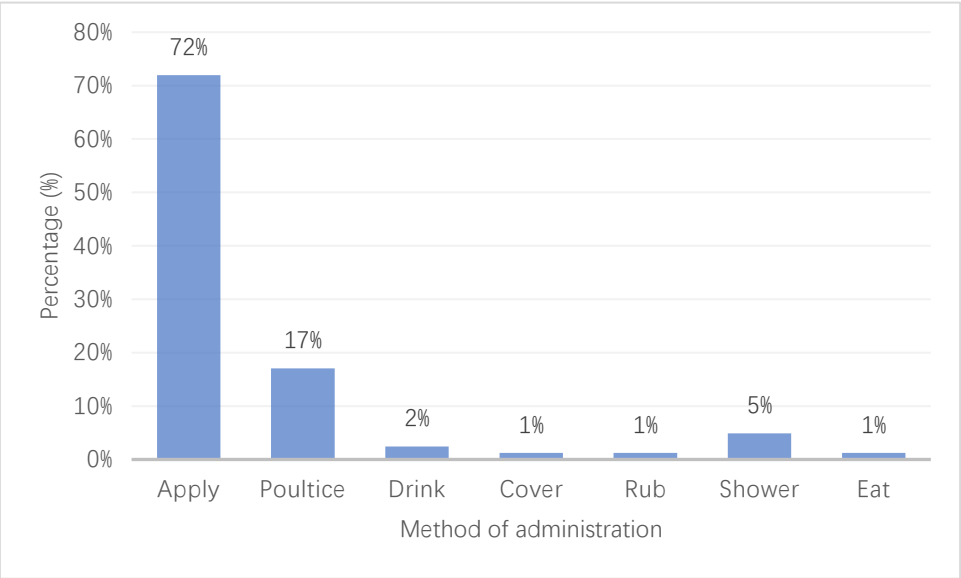


Figure 8 Percentage of preparation method

Percentage of remedies administration methods in Moh Phon's traditional Thai medicine formulary for skin diseases/ conditions were shown in Figure 9. Apply was the most frequently method of remedies administration (72%), follow by poultice (17%) and shower (5%).

Figure 9



Percentage of administration method

4.5 Literature review on active constitutent, biological and pharmacological activity and toxicological studies of five frequently plant species used for skin diseases/ conditions in Moh Phon's traditional Thai medicine formulary

The active constituents and toxicities assessment of the frequent plant species in Moh Phon's traditional Thai medicine formularies for skin diseases were shown in Table 4-6.

Table 4 Biological and pharmacology activities of frequent plant species in Moh Phon's traditional Thai medicine formularies for Skin diseases

Plant species	Pharmacology and biological activities	Parts
1.*Cocos nucifera* L.	Anthelmintic, anti-bacterial, anti-inflammatory, anti-hyperglycemic, anti-malarial, anti-oxidant,	Husk, fiber,

	anti-trichomoniasis, hepatoprotective, renal protective, anti-hypertensive and vasorelaxant, antinociceptive [319-323]	Fruit
2.*Citrus aurantifolia* Swing.	Antimicrobial, spasmolytic, antimicrobial, neuroprotective and neuromodulating, antinociceptive, antioxidant, chemo-preventive and skin sensitizing activity, antioxidant capacity, and hypolipidemic, antibacterial activity, antifungal Activity [276, 277, 280]	Fruit, Whole plant
3.*Allium sativum* L.	Lipid-lowering effects, antiplatelet activity and anti-atherosclerotic activities, anti-audiogenic, anti-immature anti-biofilm and antibacterial, anti-Angiogenesis and antithrombotic, anti-Proliferation, antiseptic [124-130]	Bulb, Clove
4.*Allium ascalonicum* L.	anti-inflammatory, anti-microbial, anti-Helicobacter pylori, anti-oxidant, anti-fungal, antiallergic, hypoglycemic and antidiabetic,	Bulb, leaf

	anticarcinogenic, wound healing, anti-angiogenesis[108, 110-117]	
5.*Cassia alata* (L.) Roxb.	Anti-infectious properties, Antibacterial and antifungal [238], anti-inflammatory, antimutagenic, analgesic, antidiabetic, antifungal and antimicrobial properties [241]	Leaf

Table 5 Active constituents of the frequent plant species in Moh Phon's traditional Thaimedicine formularies for Skin diseases

Scientific name	Active constituents
1.*Cocos nucifera* L.	Lupeol-methyl ester, Catechin, Flavonoid, Saponin, a-tocopherol, tannins, Vitamin C, Liquid acid, L-arginine[319]
2.*Citrus aurantifolia* Swing.	Monoterpene, hydrocarbons, Sesquiterpene, hydrocarbons, Oxygenated monoterpenes, Oxygenated sesquiterpenes, Monoterpene aldehydes, Monoterpene alcohols, Monoterpene ketones, Monoterpene esters, Sesquiterpene alcohols, Aliphatic aldehydes [276]

3.*Allium sativum* L.	S-allyl-L-cysteine sulfoxide (alliin), Eugenol di-glycosides and β-carboline alkaloids, Mainly diallyl sulphide, allicin, allisatin [124, 126], Ajoene (allylic disulfide)[132]
4.*Allium ascalonicum* L.	Saponins, Flavonoids, Triterpenoid glycosides, Phenolic compounds, saponins, and carbohydrates[106-109]
5.*Cassia alata* (L.) Roxb.	Alkaloids, saponins, steroids, flavonoids and terpenoid [240], Major constituents are linalool (23.0%), borneol (8.6%), pentadecanal (9.3%) and α-terpineol (5.9%) [238]

Table 6 Toxicity assessment of the frequent plant species in Moh Phon's traditional Thai medicine formularies for Skin diseases

Scientific name	Method of assessment
1.*Cocos nucifera* L.	Brine shrimp lethality assay: The LC50 of hydro-alcoholic and methanolic extract were 432.35 µg/ml and 1173.88 µg/ml respectively. MTT assay: IC50 value was found to be 1.77 mg/ml on human cervical carcinoma cell (Hela).

	Acute toxicity: Oral administration of Swiss albino mice showed LD50 value of acetone extract >5000 mg/kg and no mortality of animal. [325-327]
2. *Citrus aurantifolia* Swing.	Brine shrimp lethality assay: The methanolic extracts of stem bark and leaf showed LC50 of 10.0±0.33 and 5.0±0.74 µg/mL, respectively. which were observed to be strongly cytotoxic compared to cyclophosphamide (LC50=98.76±0.15 µg/mL). MTT assay: The methanolic extract of leaf showed CC50 of 4.02±2.85 µg/mL and CC50=5.45±2.8 µg/mL on Rd and Hep-2c human cancer cell lines, respectively which retained a comparable cytotoxicity to cyclophosphamide (CC50=2.23±0.14 µg/ mL, CC50=2.66±0.8 µg/mL) on Rd and Hep-2c human cancer cell lines, respectively. Acute toxicity: Oral administration of rat at doses of 10-5000 mg/kg. The methanolic extract showed no sign of toxicity and mortality at all concentrations. [278, 281, 282]
3. *Allium sativum* L.	Brine shrimp lethality assay: The aqueous and methanolic extracts showed LC_{50} values of 8.18 µg/ml and 10.84 µg/ml, respectively.

	MTT assay: The methanolic extract showed IC50 values of 105±2.21, 489±4.51 and 455±3.13 µg/ml on U-937, Clone E6-1 and K-562 cell, respectively. Acute toxicity: Oral administration of Wistar rats at doses of 100-5,000 mg/kg. The aqueous extract showed LD50 value more than 5,000 mg/kg, practically non-toxic. [131-132][122]
4.*Allium ascalonicum* L.	MTT assay: The butanol extract showed the most potent cytotoxic effects against ovarian carcinoma cell line (OVCAR-3), HeLa and human umbilical vein endothelial (HUVEC) cell lines with IC50 values of 38±2, 56±1.4, and 60±3.5 µg/ml, respectively. MTT assay: The ethanolic extract of both dry and fresh shallot showed IC50 values around 50 µg/ml against human hepatoma cell line (HepG2). Acute toxicity: Oral administration of ICR mice with a single dose of 2,000 mg/kg. The aqueous extract did not show any indication of physical or behavioral changes and did not cause mortality. The LD50 of the extract was estimated to be higher than 2,000 mg/kg. [118-120]

5. *Cassia alata* (L.) Roxb.	Brine shrimp lethality assay: The ethanolic extract showed LC50 value of 4.31 µg/ml for seed and 5.29 µg/ml for leaf. MTT assay: The methanolic extract did not shown significant inhibitory effect in neither Vero (normal monkey kidney cell) cells nor human mesenchymal stem (hMSCs). Acute toxicity: Oral administration of Swiss albino mice. The ethanol and methanol extracts showed practical non-toxic. [242-244]

4.6 Classification of medicinal plants used for skin diseases/ conditions in Moh Phon's traditional Thai medicine formulary

The total of 66 medicinal plants used for skin diseases/ conditions in Moh Phon's traditional Thai medicine formulary were classified into monocotyledon and dicotyledon. The result showed that 12 medicinal plants are monocotyledon and 54 medicinal plants are dicotyledon (Table 7).

Table 7 Classification of medicinal plant used in Moh Phon's formulary for Skin diseases

Monocotyledon	*Agave sisalana* Perrine *Allium ascalonicum* L. *Allium sativum* L.	*Colocasia esculenta* (L.) Schott *Curcuma longa* L.

	Alpinia galanga (L.) Willd *Areca catechu* L. *Cocos nucifera* L.	*Cymbopogon citratus* (DC.) Stapf. *Musa x paradisiaca* L. *Musa sapientum* L. *Zingiber montanum* Roxb.
Dicotyledon	*Acacia concinna* (Willd.) DC. *Apium graveolens* L. *Averrhoa bilimbi* L. *Amomum krervanh* Pierre ex Gagnep *Azima sarmentosa* (Blume) Benth. & Hook.f. *Barleria lupulina* Lindl. *Calotropis gigantean* (L.) Dryand *Camellia sinensis* (L.) Kuntze *Capsicum annuum* Linn. *Capsicum frutescens* L *Carica papaya* L. *Cassia alata (L.)* Roxb. *Centella asiatica* (L.) Urb.	*Garcinia hanburyi* Hook F. *Garcinia mangostana* L. *Gonostegia pentandra* (Roxb.) Miq *Heliotropium indicum* L. *Hopea odorata* Roxb. *Indigofera tinctoria* L. *Ipomoea aquatia* Forsk. *Lagenaria siceraria* (Molina) Standl. *Mallotus nudiflorus* (L.) Kulju & Welzen *Mimusops elengi* Linn. *Momordica charantia* L. *Myristica fragrans* Houtt. *Nicotiana tabacum* L.

	Cinnamomum camphora (L.) J.Presl *Cinnamomum verum* J. Presl. *Citrus aurantifolia* (Christm.) Swingle *Citrus hystrix* DC *Citrus maxima* (Burm.) Merr. *Clinacanthus nutans* (Burm.f.) Lindau *Coccinia grandis* (L.) J. Voigt *Coriandrum sativum* L.. *Cuminum Cyminum* L.. *Cyathula prostrata* (L.) Blume *Datura metel* L. *Diospyros mollis* Griff. *Dipterocarpus alatus* Roxb.ex G.Don *Euphorbia tirucalli* L.	*Ocimum africanum* Lour *Ocimum tenuiflorum* L. *Oldenlandia biflora L.* *Piper betle* Linn. *Piper nigrum* L. *Rhinacanthus nasutus* (Linn.) Kurz. *Sesamum indicum* L. *Shorea siamensis Miq.* *Solanum melongena* Linn. *Spondias pinnata* (L.f.) Kurz *Syzygium aromaticum* L. Merr. & Perry *Tamarindus indica* L. *Tiliacora triandra (Colebr.) Diels* *Uraria crinita* (L.) Desv. ex DC.

4.7 Scientific information of medicinal plants in Moh Phon's Traditional Thai Medicine formulary for skin conditions

In this study, 66 medicinal plants in Moh Phon's formularies for Skin diseases were identified and explained. The scientific information of each medicinal plant included its scientific name, synonyms, botanical family, common name, local name, distribution, plant description, ethnomedical uses, active constituents, pharmacological/biological activities and toxicological activities as following.

1. *Acacia concinna* (Willd.) DC.

Scientific name: *Acacia concinna* (Willd.) DC.

Synonyms: *Alpinia alba* (Retz.) Roscoe

Alpinia bifida Warb.

Alpinia carnea Griff.

Alpinia galanga var. *galanga*

Alpinia galanga var. *pyramidata* (Blume) K.Schum.

Alpinia pyramidata Blume.

Alpinia rheedei Wight.

Alpinia viridiflora Griff.

Amomum galanga (L.) Lour.

Amomum medium Lour.

Galanga major Garsault.

Galanga major infrasubsp. *oppr*

Galanga officinalis Salisb.

Hellenia alba (Retz.) Willd.

Heritiera alba Retz.

Languas galanga (L.) Stuntz

Languas pyramidata (Blume) Merr.

Languas vulgare J.Koenig

Maranta galanga L.

Zingiber galanga (L.) Stoke.

Zingiber medium Stokes.

Zingiber sylvestre Gaertn.

Common name: Shikakai, Soap-Pod, Soap acacia

Local name: Som-poi

Family: Fabaceae/Leguminosae

Distribution: Tropical Asia and occurs throughout Southeast Asia

Parts Used: Leaf, Fruit

Description of the Plant: A climbing shrub with smooth brown stripes on thorny branches, petioles 1.5 cm long and a prominent gland in the middle. Spines are short, broad-based, flat surfaces. The main stem is brown. The fruits are called beans, the pods are about 5-6 cm, they are fleshy, beaked and contracted. Each fruit has 6-10 seeds. The seeds are brown [93].

Table 1-1 Traditional uses of *Acacia concinna* (Willd.) DC.

Traditional uses	Parts Used	Reference
Jaundice, constipation, skin problem, itching, pimples, hyperpigmentation, leprosy, psoriasis, gum infection and dandruff	Fruit	[94]
Prevent diabetes and skin diseases	Leaf	
Washing wounds and facilitating wound healing	Pod	
Jaundice, constipation and skin problem, itching, pimples, hyperpigmentation and gum infection, dandruff, leprosy, psoriasis	Pod	[93]

Table 1-2 Chemical constituents of *Acacia concinna* (Willd.) DC.

Chemical constituents	Parts Used	Reference

Alkaloids, glycoside, reducing sugars, α-aminoacids, phenolic compounds, saponins, carbohydrates, steroids, tannins, flavonoids and starch	Fruit	[94]
Triterpenes, flavonoids and eugenol,	Fruit	[95]

Table 1-3 Biological and pharmacological activities of *Acacia concinna* (Willd.) DC.

Activities	Parts Used	Reference
Antioxidant	Fruit	[94]
Phytochemical and Antioxidant		
Antimicrobial	Leaf	[93]
Antioxidant, anti-coagulant, anti-platelet, anti-thrombotic, antidermatophytic and immune adjuvant activities	Not specify	[96]

Table 1-4 Toxicity assessment of *Acacia concinna* (Willd.) DC.

Toxicity assessment	Parts Used	Results	References
Cell viability assay: Adipocytes cell.	Pods	The aqueous methanol extract showed weak toxicity at concentration of 0.1 and 0.2 mg/ml.	[97]

Acute toxicity: Oral administration of Albino Wister rats at a dose of 1000 mg/kg for 24 hours.	Bark and pods	The aqueous extract showed no signs of toxicity at a dose of 1000 mg/kg.	[98]

A: Leaf and Flower, B: Seed[94], C: Fruit[95]

Figure 10 of *Acacia concinna* (Willd.) DC.

2. *Agave sisalana* Perrine

Scientific name: *Agave sisalana* Perrine

Synonyms: *Agave amaniensis* Trel. & Nowell

Agave rigida subsp. *sisalana* (Perrine) Engelm.

Agave rigida var. *sisalana* (Perrine) Engelm.

Agave segurae D.Guillot & P.Van der Meer

Agave sisalana f. armata (Trel.) Trel.

Agave sisalana subsp. *armata* (Trel.) Trel.

Agave sisalana var. *armata* Trel.

Furcraea sisaliana Posada-Ar., 1909

Common name: Sisal hemp

Local name: Pan

Family: Agaeceae

Distribution: Occasionally cultivated, native in Mexico

Parts Used: Fibre (Ash)

Description of the Plant: Robust single-bearing perennial herb, 3-9m high at flowering, with many leaves crowded into dense rosettes; ovary lower 3-loculed, style mostly enlarged at flowering, finally 6-8cm long, stigma 3-lobed. Fruit (rarely produced) oval capsule, tapering at base, green fleshy when young, black and dry when mature, with about 150 seeds. Seeds round-triangular, thin, flat, papery, black. [99].

Table 2-1 Traditional uses of *Agave sisalana* Perrine

Traditional uses	Parts Used	Reference

In India the plant is considered emmenagogue and abortive.	Not specify	[99]
In Morocco sap from the leaves is used as a wash for skin diseases. It is also used against syphilis, pulmonary tuberculosis, and jaundice. It can be used as a laxative.	Leaf	
Leaf decoction as a diuretic, while sap from the leaves is taken to treat constipation and stomach-ache and externally applied to cuts.	Leaf	
In East Africa a root decoction is drunk as a diaphoretic	Root	
Hecogenin from sisal leaves a precursor in the partial synthesis of corticosteroids such as cortisone, hydrocortisone and prednisone.	Leaf	

Table 2-2 Chemical constituents of *Agave sisalana* Perrine

Chemical constituents	Parts Used	Reference
Saponins , Glycosides, Phlobatannins , Terpenoids , Cardiac glycosides , Flavonoids, Tannins	Juice	[100]
Saponin of hecogenine	Leaf	[101]

Table 2-3 Biological and pharmacological activities of *Agave sisalana* Perrine

Activities	Parts Used	Reference
Anti-microbial activities of saponin, anti-cancer, Anti-inflammatory and Anti-cardiovascular activity	Leaf	[101]

Table 2-4 Toxicity assessment of Agave sisalana Perrine

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	The methanolic extracts showed percentage of mortality at 60% (800 and 600 PPM) and 30% (400 PPM).	[102]
MTT assay: Mouse fibroblast cell line BALB/c 3T3.	Leaf	The hexanic fraction did not induce mortality of BALB/c 3T3 cells at concentrations of 50-500 μM.	[103]
Acute toxicity:	Leaf	Acute toxicity: The aqueous extract of all	[102]

Oral administration of Wistar rats at a single dose of 50, 100, 200 and 400 mg/kg for 72 h. Sub-chronic toxicity: Oral administration of Wistar rats at the doses of 50, 100, 200 and 400 mg/kg for 14 days.		doses showed no rat mortality. Sub-chronic toxicity: Mortality rate for 50 and 100 mg/kg doses was 20%.	

Whole plant [104]

Figure 11 of *Agave sisalana* Perrine

3. *Allium ascalonicum* L.

Scientific name: *Allium ascalonicum* L.

Synonyms: *Allium carneum* Willd.

Allium fissile Gray

Allium hierochuntinum Boiss.

Common name: Shallot

Local name: Hom-daeng

Family: Alliaceae

Distribution: Southeast Asia

Parts Used: Bulbs

Description of the Plant: It is biennial or perennial herb grows up to 1-3 feet high. It possesses a single onion like tuber, 1-2 inches long, It has elongated terminal spike inflorescence stalk of 1-2 feet. It is broader at base and tapering towards apex. It possess cluster of small white flowers at its apex [105].

Table 3-1 Traditional uses of *Allium ascalonicum* L.

Traditional uses	Parts Used	Reference
Anti-haemorrhoidal, pain in pelvic region, cardiac diseases, chronic fever, chronic inflammation, Chronic skin diseases, decreased digestive enzymes, microbes/foreign organisms. It will also act as adsorbent, aggravates bile, anti-microbial, Good for eyes, Appetizer, digestant, helps in union of fractured bones, good for throat, increases blood, enhances colour and complexion, anti-inflammatory, strengthening, nourishing, rejuvenator, aphrodiasic, anti-spasmodic, Mitigates tumors, Skin diseases, wound healing, Used in ear diseases, Purifies menses	Leaf	[105]
Bacterial skin infections, tinea capitis, and hair loss	Bulb	[106]

Table 3-2 Chemical constituents of *Allium ascalonicum* L.

Chemical constituents	Parts Used	Reference

Saponins	Bulb	[107]
Flavonoids	Bulb	[107, 108]
Triterpenoid glycosides	Rhizome	[109]
Phenolic compounds, saponins, and carbohydrates	Not metioned	[106]

Table 3-3 Biological and pharmacological activities of *Allium ascalonicum* L.

Activities	Parts Used	Reference
Anti-inflammatory	Bulb	[110]
Anti-microbial	Leaf, Bulb	[111], [112, 113]
Anti-Helicobacter pylori	Leaf	[111]
Anti-oxidant	Bulb	[114]
Anti-fungal	Bulb	[112, 115]
Antiallergic	Bulb	[116]
Hypoglycemic and antidiabetic	Bulb	[114, 117]
Anticarcinogenic	Bulb	[110, 114]
Wound Healing	Bulbs	[113]
Anti-angiogenesis	Bulbs	[108]

Table 3-4 Toxicity assessment of *Allium ascalonicum* L.

Toxicity assessment	Parts Used	Results	References
MTT assay: Human cervical malignant cell line (HeLa), ovarian carcinoma cell line (OVCAR-3), and human umbilical vein endothelial cell line (HUVEC).	Flowers	The butanol extract showed the most potent cytotoxic effects against OVCAR-3, HeLa and HUVEC cell lines with IC50 values of 38±2, 56±1.4, and 60±3.5 µg/ml, respectively.	[118]
MTT assay: Human hepatoma *cell* line (*HepG2*).	Bulbs	The ethanolic extract of both dry and fresh shallot showed IC50 values around 50 µg/ml.	[119]
Acute toxicity: Oral administration of ICR (Imprinting Control Region) mice with a single dose of 2,000 mg/kg.	Bulbs	The aqueous extract did not show any indication of physical or behavioral changes and did not cause mortality. The LD50 of	[120]

		the extract was estimated to be higher than 2,000 mg/kg.	

A : Leaf[105] B:Bulb, Root [121]

Figure 12 of *Allium ascalonicum* L.

4. *Allium sativum* L.

Scientific name: *Allium sativum* L.

Synonyms: *Allium arenarium* Sadler

Allium arenarium Sadler ex Rchb.

Allium controversum Schrad.

Allium controversum Schrad. ex Willd.

Allium longicuspis Regel

Allium ophioscorodon Link

Allium pekinense Prokh.

Allium sativum f. asiae-mediae Kazakova

Allium sativum f. pekinense (Prokh.) Makino

Allium sativum f. sagittatum Kazakova

Allium sativum f. vulgare Kazakova

Allium sativum subsp. *asiae-mediae* Kazakova

Allium sativum subsp. *controversum* (Schrad. ex Willd.) K.Richt.

Allium sativum subsp. *ophioscorodon* (Link) Schübl. & G.Martens

Allium sativum subsp. sativum

Allium sativum subsp. *subrotundum* (Gren. & Godr.) K.Richt.

Allium sativum var. *controversum* (Schrad. ex Willd.) Nyman

Allium sativum var. *controversum* (Schrad. ex Willd.) Regel, 1875

Allium sativum var. *ophioscorodon* (Link) Döll

Allium sativum var. *pekinense* (Prokh.) F.Maek.

Allium sativum var. *subrotundum* Gren. & Godr.

Allium scorodoprasum subsp. *viviparum* (Regel) K.Richt.

Allium scorodoprasum var. *multibulbillosum* Y.N.Lee

Allium scorodoprasum var. *viviparum Regel*

Porrum ophioscorodon (Link) Rchb.

Porrum sativum (L.) Rchb.

Common name: Garlic

Local name: Kra-thiam

Family: Alliaceae

Distribution: Native to Iran, Kazakhstan, Kirgizstan, Tadzhikistan, Turkmenistan, Uzbekistan.

Parts Used: Bulb

Description of the Plant: A perennial flowering plant that grows up to 30–60 cm tall. It has a characteristic pungent smell with a large variety of flavors and textures when it is raw or cooked [122].

Table 4-1 Traditional uses of *Allium sativum* L.

Traditional uses	Parts Used	Reference
Hypertension, coronary heart disease, hypercholesterolemia, cancer and infections	Bulb	[123]
Fevers, headaches, intestinal worms, and dysentery		[124]
Antiparasite		[125]
Infectious diseases, influenza, chronic bronchitis, tuberculosis, asthma, whooping cough, runny nose, high blood pressure, vascular cramps, varicose veins, haemorrhoids, formation of urinary stones, gout, insufficient urinary excretion, oedema, intestinal parasites, ailments of respiratory tract, circulatory	Clove	[126]

disorders, diseases of urinary tract, dropsy and over- Weight, increases muscle tone, lowers blood pressure		

Table 4-2 Chemical constituents of *Allium sativum* L.

Chemical constituents	Parts Used	Reference
S-allyl-L-cysteine sulfoxide (alliin)	Bulb	[124]
Eugenol di-glycosides and β-carboline alkaloids		
Mainly diallyl sulphide, allicin, allisatin	Clove	[126]

Table 4-3 Biological and pharmacological activities of *Allium sativum* L.

Activities	Parts Used	Reference
Lipid-lowering effects, antiplatelet activity and antiatherosclerotic activities	Bulb	[127]
Anti-adipogenic		[124]
Anti-immature		[125]
Anti-biofilm and Antibacterial		[128]
Anti-Angiogenesis and Antithrombotic		[129]
Anti-Proliferation		[130]
Antiseptic, derivant, vermifuge	Clove	[126]

Table 4-4 Toxicity assessment of *Allium sativum* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Bulb	The aqueous and methanolic extracts showed LC50 values of 8.18 µg/ml and 10.84 µg/ml, respectively.	[131]
MTT assay: U-937 (human leukemic monocyte lymphoma cell line), Clone E6-1 (human acute T cell leukemia cell line) and K-562 (human chronic myelogenous leukemia cell line)	Bulb	The methanolic extract showed IC50 values of 105±2.21, 489±4.51 and 455±3.13 µg/ml on U-937, Jurkat Clone E6-1 and K-562 cell, respectively. In this study, the garlic extract showed cytotoxic effects to all the human leukemic cell lines tested.	[132]
Acute toxicity: Oral administration of Wistar rats at doses of 100, 1,000, 2,500 and 5,000 mg/kg.	Bulb	The aqueous extract showed LD50 value more than 5,000 mg/kg, practically non-toxic.	[122]

Acute toxicity test: An Indian air-breathing fish, Clarias batrachus Linn.	Bulb	The garlic extract showed LC50 of 7391.36 mg/kg.	[132]

Bulb clove [126]

Figure 13 of *Allium sativum* L.

5. *Alpinia galanga* (L.) Willd

Scientific name: *Alpinia galanga* (L.) Willd

Synonyms: *Alpinia alba* (Retz.) Roscoe

Alpinia bifida Warb.

Alpinia carnea Griff.

Alpinia galanga var. galanga

Alpinia galanga var. *pyramidata* (Blume) K.Schum.

Alpinia pyramidata Blume

Alpinia rheedei Wight

Alpinia viridiflora Griff.

Amomum galanga (L.) Lour.

Amomum medium Lour.

Galanga major Garsault

Galanga major infrasubsp. *oppr*

Galanga officinalis Salisb.

Hellenia alba (Retz.) Willd.

Heritiera alba Retz.

Languas galanga (L.) Stuntz

Languas pyramidata (Blume) Merr.

Languas vulgare J.Koenig

Maranta galanga L.

Zingiber galanga (L.) Stokes

Zingiber medium Stokes

Zingiber sylvestre Gaertn.

Common name: Glalangl. Greater Galangal. Chinese Ginger

Local name: Kha

Family: Zingiberaceae

Distribution: Tropical realm of Asia

Parts Used: Rhizome

Description of the Plant: Robust rhizomatous herb, forming large clumps, up to 3 m tall. Rhizomes whit-ish externally, pale yellow internally, 1 cm long, light yellow; anther 5–7 mm long, creamy white. Capsule oblong, slightly contracted at middle, dark red, 1–1.5 cm long, 5–7 mm wide. Seeds black [133]

Table 5-1 Traditional uses of *Alpinia galanga* (L.) Willd

Traditional uses	Parts Used	Reference

It is used for emaciation and to clean the mouth. It stimulates the digestive power, appetite and acts as a purgative	Seed	[134]
It is generally used as a spice. It is also a good source of essential oil. The flowers and young shoots are also used as a vegeTable or as a spice.	Rhizome	
Used to treat pungent, bitter, heating, stomachic, improve appetite, disease of heart, aphrodisiac tonic, expectorant, use in heal, ache, lumbago, rheumatic pains, chest pain, diabetes, burning of liver, kidney disease, disinfectants.	Not specify	[135]

Table 5-2 Chemical constituents of *Alpinia galanga* (L.) Willd

Chemical constituents	Parts Used	Reference
Phenylpropanoids	Rhizome	[136]
Galango flavonoid, acetoxychavicol acetate (ACE), phenylpropanoids and phydroxybenzaldehyde, acetoxycineoles, glucopyranosides, glucopyranoside, and glucopyranoside	Rhizome	[135]
Galangin, Kaempferol, Quercetin, Myricetin, Galangin 3-methyl ether, Kaempferide,	Rhizome, seed	[133]

Isokaempferide, Kumatakenin, Isorhamnetin, Quercetin 3-methyl ether, Pinobanksin 3-acetate, Pinobanksin 3-cinnamate, Alpinone, Pinocembrin, Catechin.		

Table 5-3 Biological and pharmacological activities of *Alpinia galanga* (L.) Willd

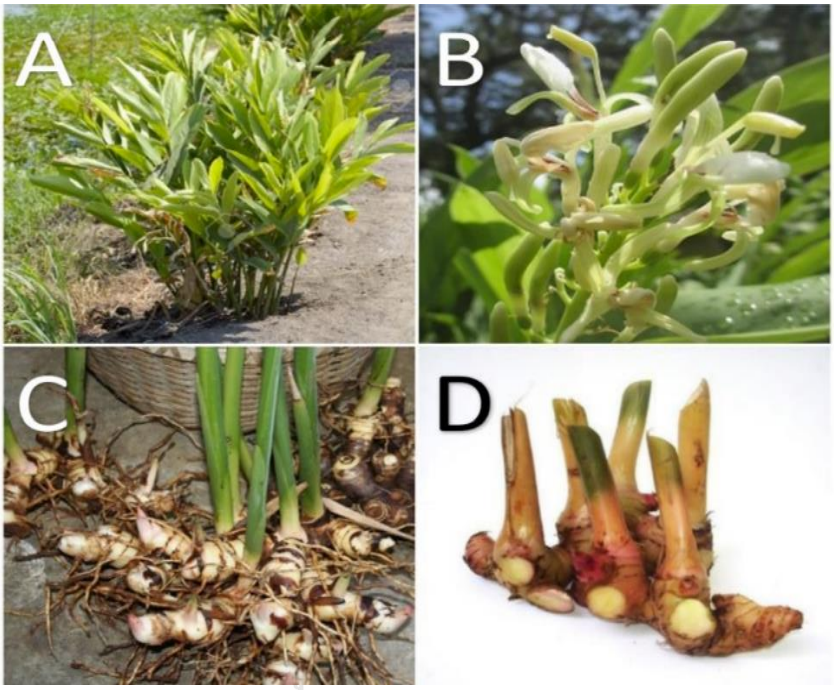
Activities	Parts Used	Reference
Anti-microbial, anti-cancer, anti-oxidant, anti-diabetic, anti-inflammatory, immunomodulating, hepatoxicity, anti-fungal, anti-ulcer	Rhizome	[134]
Insecticidal	Rhizome	[136]
Anti-tubercular activity, hypothermia, bronchial catarrh, tonic, stomachic and stimulant	Rhizome	[135]

Table 5-4 Toxicity assessment of *Alpinia galanga* (L.) Willd

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Rhizomes	Methanolic Extraction In cytotoxicity study, the extract caused 46.7% mortality of brine shrimp larvae after 24 hours at a	[137]

		concentration of 62.5 µg/mL which is considered moderate toxic. While, at a concentration of 1000µg/mL, the mortality rate of brine shrimp larvae was 100% which is considered extremely toxic.	
MTT assay: Breast cancer cells (4T1) and normal fibroblast cells (NIH-3T3).	Rhizomes	Ethanolic extract effectively inhibited the growth of 4T1 cells with an IC50 value of 135 µg/ml while up to a concentration of 200 µg/ml, did not show a cytotoxic effect on NIH-3T3 cells.	[138]
Acute toxicity test: Oral administration of Swiss albino mice at a dose of 0.5 g/kg, 1 g/kg, and 3 g/kg for 24 hours. Chronic toxicity test: Oral administration of	Rhizomes	Ethanol extract, Acute toxicity test: The results showed no signs of toxicity and no mortality up to dose of 3 g/kg. Chronic toxicity test: The mortality in the test group was	[139]

Swiss albino mice at a dose of 100 mg/kg/day for 3 months.		not significant as compared to the control.	



A: Whole plant B: Flower C: Root D: Rhizome

Figure 14 of *Alpinia galanga* (L.) Willd [140]

6. *Amomum krervanh* Pierre ex Gagnep

Scientific name: *Amomum krervanh* Pierre ex Gagnep

Synonyms: *Amomum verum* Blackw.

Amomum krervanh Pierre ex Gagnep.

Common name: Round Siam cardamom

Local name: Kra-van

Family: Zingiberaceae

Distribution: Native to Thailand and Cambodia, widely in Southeast Asia

Parts Used: Fruit

Description of the Plant: The plant consists of several parts such as underground rhizomes, the pseudostem, which is made of leaf sheath and fruit. The leafy shoots are formed by long, sheathlike stalks encircling one another [141].

Table 6-1 Traditional uses of *Amomum krervanh* Pierre ex Gagnep

Traditional uses	Parts Used	Reference

Stomach disorders	Not mentioned	[142]
Digestion promoter and treatment of dyspnea	Root and rhizome	[143]

Table 6-2 Chemical constituents of *Amomum krervanh* Pierre ex Gagnep

Chemical constituents	Parts Used	Reference
Myrtenal, myrtenol and trans-pinocarveol	Fruit	[144]
Artemisinin	Fruit	[145]
β-pinene, cineole, linalool, a-terpinyle, and terpinyle acetate	Fruit	[146]
1,8-cineole (59.7%), b-pinene (2.4%), a-pinene (1.8%), p-cymene (1.32%), and a-terpinenyl acetate (5.10%)	Fruit	[147]

Table 6-3 Biological and pharmacological activities of *Amomum krervanh* Pierre ex Gagnep

Activities	Parts Used	Reference
Antimalarial	Fruit	[144, 145]
High antibacterial activity against Grampositive Bacillus subtilis as well as against Gram-negative Escherichia coli	Root and rhizome	[143]

Table 6-4 Toxicity assessment of *Amomum krervanh* Pierre ex Gagnep

Toxicity assessment	Parts Used	Results	References
Larvicidal activity against *Culex quinquefasiatus*.	Fruit	The ethanolic extract showed LC50 of 235.79 ppm.	[148]
Topical toxicity on *Apis mellifera* adults	Fruit	The ethanolic extract showed 48 h-LD50 value of 158.23 µg each bee.	[149]
MTT assay: Macrophage RAW 264.7 cells.	Fruit	The ethanolic extract showed cell viability of more than 80%. At 18.68±2.16 µg/ml	[150]

Whole plant with shoots

Figure 15 of *Amomum krervanh* Pierre ex Gagnep [151]

7. *Apium graveolens* L.

Scientific name: *Apium graveolens* L.

Synonyms: *Apium celleri* Gaertn.

Apium decumbens Eckl. & Zeyh.

Apium graveolens f. lusitanicum (Mill.) J.Helm

Apium graveolens subsp. *butronensis* (D.Gómez & G.Monts.) Aizpuru

Apium graveolens subsp. *dulce* (Miller) Schübler & Martens

Apium graveolens subsp. *rapaceum* (Mill.) P.D.Sell

Apium graveolens subsp. *rapaceum* (Mill.) Schübl. & G.Martens, 1834

Apium graveolens var. *bashmensis* Hosni

Apium graveolens var. *butronensis* D.Gómez & G.Monts.

Apium graveolens var. *dulce* (Mill.) DC.

Apium graveolens var. *dulce* (Mill.) Pers.

Apium graveolens var. *lusitanicum* (Mill.) DC.

Apium graveolens var. *maritimum* Dumort.

Apium graveolens var. *montevidensis*

Apium graveolens var. *rapaceum* (Mill.) DC., 1830

Apium graveolens var. *rapaceum* (Mill.) Gaudin

Apium graveolens var. *rapaceum* (Mill.) Poir.

Apium graveolens var. secalinum Alef., 1866

Apium integrilobum Hayata

Apium lobatum Gilib.

Apium lusitanicum Mill.

Apium maritimum Salisb.

Apium napaceum Chaz.

Apium palustre Thore

Apium *rapaceum* Mill.

Apium vulgare Bubani

Carum graveolens (L.) Koso-Pol.

Celeri graveolens (L.) Britton

Celeria graveolens (L.) Britto

Helosciadium graveolens (L.) Rojas Acosta

Helosciadium ruta (Burm.fil.) DC.

Helosciadium rutaceum St.-Lag.

Libanotis graveolens G.Don

Selinum graveolens (L.) E.H.L.Krause

Seseli graveolens (L.) Scop.

Sison ruta Burm.fil.

Sison trifidum Burm.

Sison trifidum Burm. ex DC.

Sium apium Roth

Sium graveolens (L.) Vest

Smyrnium laterale Thunb.

Family: Apiaceae/ Umbelliferae

Common name: Celery, Smaltage

Local name: Khuen-chai

Distribution: Europe

Parts Used: Whole plant, leaf

Description of the Plant: Celery (Apium graveolens L.) is a widespread perennial or annual plant. The leaves of celery are quite different in pattern and petiole produces

more leaves that are relatively thinner having delicate petioles. Colors of the flowers can range from green to pale green and pale green to yellow [152].

Table 7-1 Traditional uses of *Apium graveolens* L.

Traditional uses	Parts Used	Reference
Asthma, bronchitis, hypertension, diabetes, gastrointestinal disorders, urinary calculi, visceral spasm, impotency, and hepatitis	Not specify	[153]
Rheumatoid arthritis, gout, and kidney complaints	Seed	[154]

Table 7-2 Chemical constituents of *Apium graveolens* L.

Chemical constituents	Parts Used	Reference
Alkaloids, phenolic acids, terpenes, glycosides, and flavonoids	Not specify	[153]
Limonene, sedanenolide and butylphthalide	Seed	[155]
Folic acid, potassium, sodium, fibers, β-carotene, magnesium, silica and chlorophyll	Not specify	[152]

Table 7-3 Biological and pharmacological activities of *Apium graveolens* L.

Activities	Parts Used	Reference

Anticancer, anti-obesity, anti-hepatotoxic, and antihypertensive	Not specify	[153]
Antioxidant, and antimicrobial activity	Not specify	[153]
Antimicrobial, antiviral activity against the herpes simplex virus,	Seed	[155]

Table 7-4 Toxicity assessment of *Apium graveolens* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Fruit	The aqueous extract showed LC50 value of 900 µg/ml.	[156]
MTT assay: The anti-proliferative activity of five cancer cell lines (Vero, 3A, L-929, A-549, and L6.BRL)	Whole plant	The hydroethanolic extract demonstrated moderate to high cytotoxic effects in five-cell lines with the IC50 values ranging of 443-168.5 µg/ml.	[153]

Acute toxicity: Oral administration of Wistar albino rats in the dose range 0.25g-12 g/kg for 14 days.	Aerial parts	The ethanolic extract revealed LD50 dose of 7.55 g/kg body weight and no toxic symptoms over a period of 14 days.	[157]

Whole plant[158]

Seed [159]

Figure 16 of *Apium graveolens* L.

8. *Areca catechu* L.

Scientific name: *Areca catechu* L.

Synonyms: *Areca catechu* f. communis Becc.

Areca catechu var. *alba* Blume

Areca catechu var. *batanensis* Becc.

Areca catechu var. *longicarpa* Becc.

Areca catechu var. *nigra* Giseke

Areca catechu var. *silvatica* Becc.

Areca cathechu Burm.f.

Areca cathecu L.

*Areca faufe*l Gaertn.

Areca himalayana Griff.

Areca himalayana Griff. ex H.Wendl.

Areca hortensis Lour.

Areca macrocarpa Becc.

Areca nigra Giseke

Areca nigra Giseke ex H.Wendl.

Sublimia areca Comm.

Sublimia areca Comm. ex Mart.

Sublimia areca infrasubsp. Publ

Common name: Areca palm, Betelnut palm

Local name: Mark

Family: Arecaceae

Distribution: Asia and Pacific

Parts Used: Fruit, nut

Description of the Plant: Commonly known as Betel palm or Betel nut tree is a species of palm. Areca palms are grown in India, Malaysia It is a medium-sized tree growing to 20 m tall with a trunk 20-30 cm in diameter. The leaves are 1.5-2 m long, pinnate with numerous crowded leaflets [160].

Table 8-1 Traditional uses of *Areca catechu* L.

Traditional uses	Parts Used	Reference
Cure diseases with digestive, carminative, antiulcer, anti-diarrheal, anthelmintic, anti-malarial, anti-hypertension, diuretic, antibacterial, hypoglycemic, anti-heartburn properties	Fruit nut	[161]
Kill parasites and promote digestion, abdominal distension, dyspepsia, dysentery, and constipation), parasitic diseases, and edematous disease	Seed	[162]
Diabetic problems	Seed	[163]

Table 8-2 Chemical constituents of *Areca catechu* L.

Chemical constituents	Parts Used	Reference
Arecoline, arecaidine, guvacine, guvacoline, isoguvacine, arecolidine and homoarecoline	Fruit nut	[161]
Arecoline	Seed	[163]
Flavonoid, tannin, saponin		
Alcaloid, flavonoid, saponin and tannin	Seed	[164]

Arecatemines A-C (1–3), together with five known ones (4–8)	Fruit nut	[165]

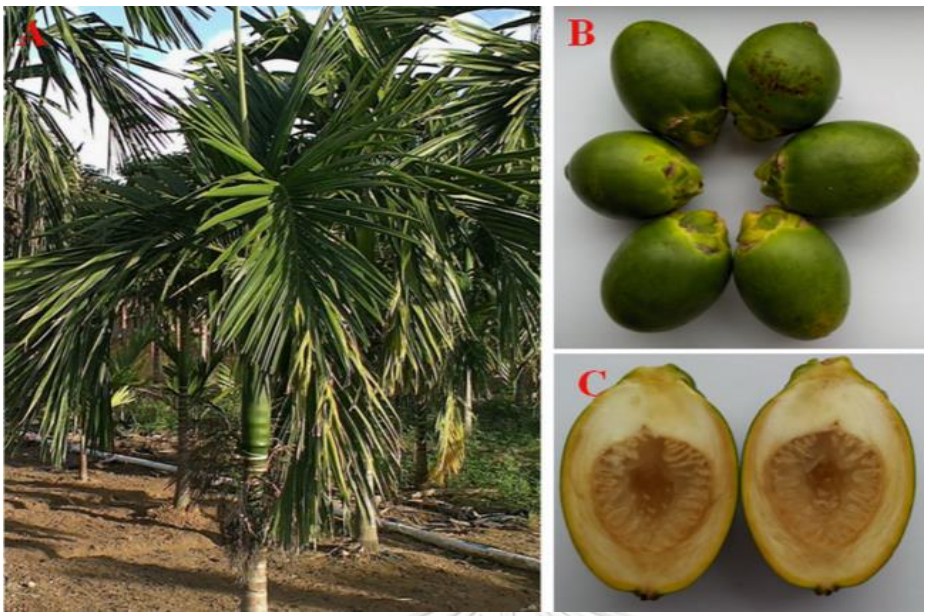
Table 8-3 Biological and pharmacological activities of *Areca catechu* L.

Activities	Parts Used	Reference
Laxative, digestive, carminative, antiulcer, anti-diarrheal, anthelmintic, anti-malarial, anti-hypertension, diuretic, prohealing, antibacterial, hypoglycemic, anti-heartburn	Fruit nut	[161]
Significant positive activities in the nervous system	Fruit nut	[165]
Anti-bacteria	Fruit nut	[162]

Table 8-4 Toxicity assessment of *Areca catechu* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Seed	The methanolic extract showed an LC50 value of 347.86 µg/ml.	[163]
Brine shrimp lethality assay (BSLA)	Seed	The acetonic extract showed more cytotoxicity than the ethanolic extract with LC50 values of 17.02	[162]

		µg/ml and 20.14 µg/ml, respectively.	
MTT assay: Human oral squamous carcinoma *cell* line (HSC-2, HSC-3) and human keratinocyte *cell* line (*HaCaT*)	Seed	The ethanolic extract showed IC50 of 629.50 µg/ml in HSC-2 cells and 164.06 µg/ml in HSC-3 but did not develop cytotoxicity to HaCat cells.	[166]
Acute toxicity: Oral administration of Sprague-Dawley rats at single dose 15.000 mg/kg body weight for 14 days.	Seed	Aqueous extract The LD50 was found to be >15.00 mg/kg body weight and no mortality was observed during the course of study period.	[167]



A: Whole plant B: Fruit C: Inside of fruit

Figure 17 of *Areca catechu* L. [168]

9. *Averrhoa bilimbi* L.

Scientific name: *Averrhoa bilimbi* L.

Synonyms: *Averrhoa abtusangulata* Stokes

Averrhoa obtusangula Stokes

Common name: Oxalis

Local name: Taling-pling

Family: Oxalidaceae

Distribution: Tropical and subtropical

Parts Used: Flower, fruit

Description of the Plant: A small tree which grows up to 15 m high with sparsely arranged branches. It has compound leaves with twenty–forty leaflets each and 5–10 cm long. The fruits are greenish in color with a firm and juicy flesh which becomes soft on ripening [169].

Table 9-1 Traditional uses of *Averrhoa bilimbi* L.

Traditional uses	Parts Used	Reference
Fever, inflammation of the rectum, and diabetes	Leaf	[169]
Pimples, scurvy, bilious colic, whooping cough, hypertension, obesity, and diabetes	Fruit	

Table 9-2 Chemical constituents of *Averrhoa bilimbi* L.

Chemical constituents	Parts Used	Reference

Tannins, Phlobatannins, Saponins, Flavonoids Terpenoids, Cardiac glycosides, Anthocyanins Flavonoid, Alkaloids, Phenols	Leaf, Fruit	[170]
Nonanal (2.7 mg/kg), (Z)-3-hexenol (0.48 mg/kg), hexadecanoic acid (0.31 mg/kg), octane (0.29), tricosane (0.27 mg/kg), (E)-2-decenal (0.26 mg/kg), nonanoic acid (0.25 mg/kg), (Z)-9-pentacosene (0.24 mg/kg), 2-furfural (0.18 mg/kg), and (Z)-9-tricosene (0.11 mg/kg). The remaining compounds were present in infinitesimal quantities (<0.1 mg/kg).	Fruit pulp	[169]
Alkaloid, tannins, saponins, flavonoids, cardiac glycosides, glycosides, triterpenes, phenols, and carbohydrates	Leaf	[169]

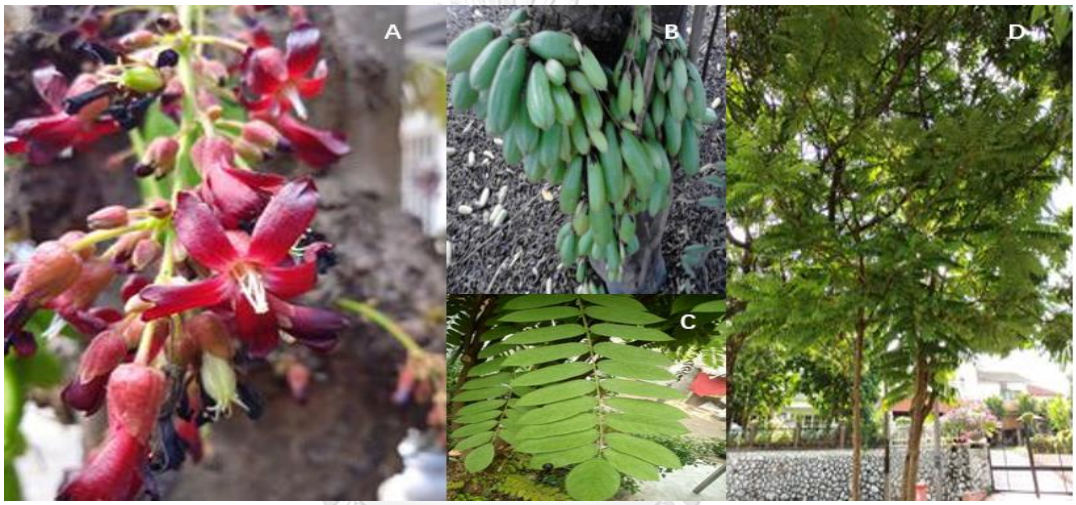
Table 9-3 Biological and pharmacological activities of *Averrhoa bilimbi* L.

Activities	Parts Used	Reference
Antioxidant	Leaf, Fruit, Twigs	[171, 172]
Antioxidant activity, catalytic activity, antihyperlipidemic, nitric acid inhibition, antidiabetic and antimicrobial and cytotoxic	Fruit	[171]
Antibacterial	Leaf, Fruit	[170, 173]

Table 9-4 Toxicity assessment of *Averrhoa bilimbi* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	The Ethanol extract showed LC50 value of 581 µg/ml. moderate cytotoxic activity	[169]
	Fruit	The methanol extract, CCl4 fraction and petroleum ether fraction showed LC50 values of 0.005 µg/ml, 1.198 µg/ml and 0.781 µg/ml, respectively.	
MTT assay: MCF-7 human breast cancer cell.	Fruit and leaf	The methanolic fruit extract exhibited cytotoxic potential against MCF-7 human breast cancer cell lines with an IC50 value of 154.9 µg/ml whereas an IC50 value of 668 µg/ml was observed for ethanolic leaf extract.	[174]

Acute toxicity: Oral administration of Sprague Dawley rats at a single dose of 2000 mg/kg and 5000 mg/kg.	Fruit	The ethanolic extract showed LD50 value of higher than 5000 mg/kg.	[175]



A: Flower, B:Fruit, C:Leaf, D: Whole plant

Figure 18 of *Averrhoa bilimbi* L. [171]

10. *Azima sarmentosa* (Blume) Benth. & Hook.f.

Scientific name: *Azima sarmentosa* (Blume) Benth. & Hook.f.

Synonyms: *Actegeton* Blume

Kandena Raf.

Monebia L'Her.

Monetia L'Hér.

Common name: Thorn jasmine

Local name: Ton-phong-dor

Family: Salvadoraceae

Distribution: Tropical Africa, Asia and Madagascar

Parts Used: Root, Bark, Leaf

Description of the Plant: Shrubs erect; branches 2-4 m tall, scrambling or drooping. Axillary spines 2-16 mm, strict and acute. calyx 1.2-1.5 mm; petals shorter than in male flowers. Berry white or green, globose [176].

Table 10-1 Traditional uses of *Azima sarmentosa* (Blume) Benth. & Hook.f.

Traditional uses	Parts Used	Reference
Prevent cancer	Not specify	[177]

Table 10-2 Chemical constituents of *Azima sarmentosa* (Blume) Benth. & Hook.f.

Chemical constituents	Parts Used	Reference

Alkaloids, tannins, antraquinones and cardiac glycosides	Not specify	[178]

Table 10-3 Biological and pharmacological activities of *Azima sarmentosa* (Blume) Benth. & Hook.f.

Activities	Parts Used	Reference
Antiviral	Not specify	[179]

Table 10-4 Toxicity assessment of *Azima sarmentosa* (Blume) Benth. & Hook.f.

Toxicity assessment	Parts Used	Results	References
Larvicidal effect on larvae of tick; Boophilus microplus.	Stem&leaves and root	The ethanolic extract of stem&leaves and root showed 74.91% and 73.58 mortality rate, respectively.	[181]

A: Leaf with flower [182], B: whole plant

Figure 19 of *Azima sarmentosa* (Blume) Benth. & Hook.f.

11. *Barleria lupulina* Lindl.

Scientific name: *Barleria lupulina* Lindl.

Synonyms: *Barleria macrostachya* Bojer

Barleria monostachya Bojer

Barleria monostachya Bojer ex Bouton, 1834

Barleria norbertii Benoist

Dicliptera spinosa Lodd.

Dicliptera spinosa Lodd. ex Nee

Common name: Hop-headed barleria

Local name: Salet-phang-phon-tua-phu

Family: Acanthaceae

Distribution: Tropical and subtropical regions

Parts Used: Root, Leaf

Description of the Plant: It is a tiny bush widely distributed and domesticated in the Southeast Asia region [183].

Table 11-1 Traditional uses of *Barleria lupulina* Lindl.

Traditional uses	Parts Used	Reference
Used traditionally as an anti-inflammatory, antidiabetic, analgesic, antimicrobial and anti-ulcerogenic agent.	Not specify	[184]

Bleeding when cut and the as poultice to relief pain. It is also used as an anti-inflammatory against insect bites, snake bites, herpes simplex virus	Leaf	[185]
Anti-inflammatory agent for insect bites and as a remedy for herpes simplex and varicella zoster lesions	Not specify	[183]

Table 11-2 Chemical constituents of *Barleria lupulina* Lindl.

Chemical constituents	Parts Used	Reference
Terpenes, flavonoids, lignins, alkaloids, particularly the iridoid glycosides.	Not specify	[186]
Glycosides i.e. Barlerin, shanzhiside, methyl ester	Leaf and stem	[184]
Alkaloids, steroids, saponins, cardiac glycosides, tannins, aminoacids, sugars and flavonoids	Leaf	
Barlerin, acetylbarlerin, shanzhiside methyl ester, acetylshanzhiside	Leaf	[185]

Table 11-3 Biological and pharmacological activities of *Barleria lupulina* Lindl.

Activities	Parts Used	Reference

Anti-inflammatory, analgesic, anti-leukemic, antitumor, anti-hyperglycemic, anti-amoebic, virucidal, diuretic, bactericidal and antibiotic	Not specify	[184]
Antibacterial, antioxidant and Immunomodulatory	Leaf and stem	[187]
Antimicrobial, Anti-inflammatory, Analgesic, Antiulcerogenic, Antidiabetic, Neuropharmacological, Toothache, Antibacterial, Anticancer, Antiartheritis, Acute and sub-chronic diuretic, Anti-viral	Not specify	[184]

Table 11-4 Toxicity assessment of *Barleria lupulin*a Lindl.

Toxicity assessment	Parts Used	Results	References
MTT assay: Hep G2 cells (a perpetual cell line consisting of human liver carcinoma cells).	Leaf	The ethanolic extract was effective at 50 µg/ml while aqueous extract inhibited cell growth at 1000 µg/ml. Only 30% cell death was observed in both cases after 24 h.	[188]
NRU assay: Hep G2 cell line.	Leaf	The ethanolic extract caused 52% cell death at 750 µg/ml and IC50 value was found at 650 µg/ml.	[188]

Toxicity test: Oral administration of albino rat at doses of 200, 400, 600 mg/kg.	Leaf and stem	Toxicity analysis of all different doses of methanolic leaf and stem extracts showed no mortality of albino rats.	[187]

Figure 20 of *Barleria lupulina* Lindl. [189]

12. *Calotropis gigantea* (L.) Dryand

Scientific name: *Calotropis gigantea* (L.) Dryand

Synonyms: *Calotropis gigantea* (L.) W.T.Aiton

Common name: Milk weed, Sodom Apple (Deseret), Madar, Giant milkweed

Local name: Rak

Family: Apocynaceae

Distribution: Tropical and subtropical regions of the world

Parts Used: Leaf

Description of the Plant: It is a glabrous and laticiferous shrub known as “Swallow Wort” or “Milk Weed” [190].

Table 12-1 Traditional uses of *Calotropis gigantea* (L.) Dryand

Traditional uses	Parts Used	Reference
Anthelmentic, leprosy, asthma, diabetes mellitus, rheumatoid arthritis, neurodermatitis, syphilis and cancers	Not metioned	[191]

Disorders such as diabetes mellitus, bronchial asthma, rheumatoid arthritis, and nervous disorders	Flower	[192]

Table 12-2 Chemical constituents of *Calotropis gigantea* (L.) Dryand

Chemical constituents	Parts Used	Reference
Alkaloids, cyanogenic, glycosides, phenolics, tannins, cardenolides, flavonoids, terpenes and sterols	Not specify	[192]
Hydroxymethyl furfural	Leaf	

Table 12-3 Biological and pharmacological activities of *Calotropis gigantea* (L.) Dryand

Activities	Parts Used	Reference
Analgesic, antimicrobial, antioxidant, anti-pyretic, anti-inflammatory, insecticidal, cytotoxic, hepatoprotective, pregnancy interceptive, procoagulant and wound healing activities.	Not specify	[193]
Analgesic, antitumor, antihelmintic, antioxidant, hepatoprotective, antidiarrhoeal, anticonvulsant, antimicrobial, oestrogenic, antinociceptive, and antimalarial activity.	Not specify	[194]

Analgesic activity, antimicrobial and cytotoxic activity.	Flower	[192]
Anti-diarrhoeal activity, anticandida activity, antibacterial activity, antioxidant activity, and antidiabetic activity	Leaves and aerial part	

Table 12-4 Toxicity assessment of *Calotropis gigantea* (L.) Dryand

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf and root	The methanolic extract, ethyl acetate and n-hexane fractions of root showed LC50 values of 0.56, 0.95 and 1.36 µg/ml, respectively whereas n-hexane fraction of leaf showed LC50 value of 2.42 µg/ml .	[195]
MTT assay: Three human cancer cell lines: non-small cell lung carcinoma (A549), colon carcinoma (HCT 116) and hepatocellular carcinoma	Leaf	The dichloromethane extract showed strongly cytotoxic against three human cancer cell lines, but nontoxic to Chinese hamster ovary (AA8).	[196]

(Hep G2) and Chinese hamster ovary (AA8).			
Sub-acute toxicity: Intraperitoneal administration of Swiss albino mice at doses of 50, 100, 200, 500, 1000 and 2000 mg/kg for 28 days.	Aerial part (Latex)	The ethanolic and methanolic extracts do not cause sub-acute toxicity up to the level of 1000 mg/kg.	[197]

Whole plant with leaf and flower

Figure 21 of *Calotropis gigantea* (L.) Dryand [198]

13. *Camellia sinensis* (L.) Kuntze

Scientific name: *Camellia sinensis* (L.) Kuntze

Synonyms: *Camellia arborescens* Hung T. Chang & F.L. Yu

Camellia bohea (L.) Sweet

Camellia chinensis (Sims) Kuntze

Camellia sinensis f. *macrophylla* (Siebold ex Miq.) Kitam.

Camellia sinensis f. *parvifolia* (Miq.) Sealy

Camellia sinensis f. *rosea* (Makino) Kitam.

Camellia sinensis var. *sinensis*

Camellia thea Link (Illegitimate)

Camellia theifera var. *macrophylla* (Siebold ex Miq.) Matsum.

Camellia viridis Sweet

Thea bohea L.

Thea bohea var. *stricta* Aiton

Thea cantoniensis Lour.

Thea chinensis Sims

Thea cochinchinensis Lour.

Thea grandifolia Salisb.

Thea latifolia Lodd. ex Sweet

Thea longifolia Nois. ex Steud.

Thea olearia Lour. ex Gomes

Thea oleosa Lour.

Thea parvifolia Salisb.

Thea sinensis L.

Thea sinensis var. *macrophylla* Siebold

Thea sinensis var. *parvifolia* Miq.

Thea stricta Hayne

Thea viridis L.

Theaphylla anamensis Raf.

Theaphylla cantonensis (Lour.) Raf.

Theaphylla laxa Raf.

Theaphylla oleifera Raf.

Theaphylla viridis Raf.

Common name: Tea, cha, chai

Local name: Cha

Family: Theaceae

Distribution: Tropics and subtropics

Parts Used: Leaf, Bud, Flowers

Description of the Plant: Green tea is a small shrub that can expand up to 30 feet high but is customarily trimmed to 2-5 feet when cultivated for its leaves. The leaves are naturally murky green and glossy with notched edges and are 2-5cm broad and 4-15cm long [199].

Table 13-1 Traditional uses of *Camellia sinensis* (L.) Kuntze

Traditional uses	Parts Used	Reference
It prevention and treatment of a variety of cancers, mental alertness, weight loss, lowering cholesterol level, and UV protection.	Leaf	[199]
It could cure headaches, body aches, and pains to constipation and depression.	Leaf	[200]

Table 13-2 Chemical constituents of *Camellia sinensis* (L.) Kuntze

Chemical constituents	Parts Used	Reference
Caffeine, theobromine, theophylline, xanthine, ascorbic acid, nicotinic acid, riboflavin, pantothenic acid, quercetin, kaempferol and inositol	Leaf	[201]
Alkaloids, flavonoids, saponins, tannins, and steroids or triterpenoids	Leaf	[202]

Catechin [(-)-epicatechin gallate (ECG), (-)-epicatechin (EC), (-)-epigallocatechin (EGC) and (-)-epigallocatechin gallate (EGCG)]	Not specify	[203]

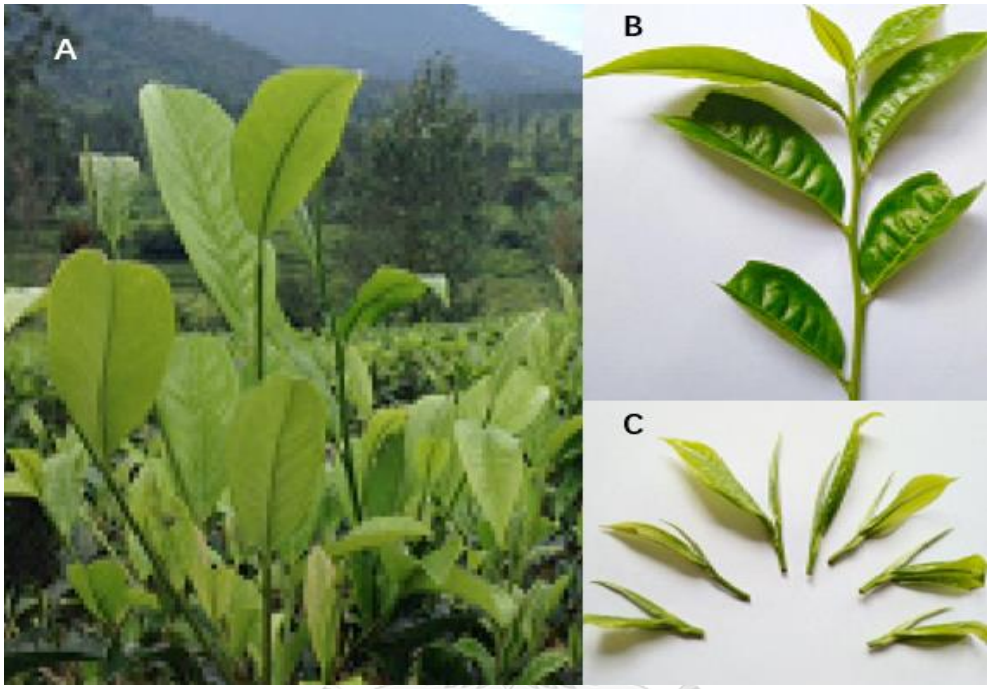
Table 13-3 Biological and pharmacological activities of *Camellia sinensis* (L.) Kuntze

Activities	Parts Used	Reference
DPP IV Inhibitory	Tea leaf Bud	[204]
Antioxidant	Leaf	[199, 201, 202]
Anti-diabetic, hypocholesterolemic, antiinflammatory, anti-carcinogenic, anti-cavity, thermogenic, probiotic, antimicrobial and antiviral	Leaf	[199]

Table 13-4 Toxicity assessment of *Camellia sinensis* (L.) Kuntze

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf and silver bud	The LC50 value of the ethanolic extract was 5.312 µg/ml.	[205]
MTT assay: The anti-proliferative activity on	Aerial part	The hydroalcoholic extract showed considerable inhibition	[206]

carcinoma colon (Caco-2) cell line and mouse normal fibroblast cell line L929.		of growth of Caco-2 cells, significant at 800 µg/ml but little effect on L929 cells.	
Acute toxicity: Oral administration of Sprague–Dawley (SD) rat at a dose of 12 g/kg for 14 days. Sub-chronic toxicity: Oral administration of SD rat at the concentrations of 1.0, 2.0 and 4.0g/kg for 13 weeks.	Flower	Acute toxicity: The LD50 value of aqueous extract was >12.0g/kg body weight. Sub-chronic toxicity: No dose-related effects on survival, growth, hematology, blood chemistry, organ weights, or pathologic lesions were observed.	[207]
Acute toxicity: Oral administration of Deutschl, Denken, and Yoken (DDY) mice at a dose of 1250, 2500, and 5000 mg/kg for 14 days.	Leaf	The LD50 of ethanolic extract was greater than 5000 mg/kg.	[203]



A: Whole plant B: Leaf C: Shoot

Figure 22 of *Camellia sinensis* (L.) Kuntze [208]

14. *Capsicum annuum* Linn.

Scientific name: *Capsicum annuum* Linn.

Synonyms: *Capsicum abyssinicum* A.Rich.

Capsicum angulosum Mill.

Capsicum annuum f. *bicolor* Makino

Capsicum annuum f. *certoides* Fingerh.

Capsicum annuum f. *chlorocarpum* Kuntze

Capsicum annuum f. *erectum* Makino

Capsicum annuum f. *incrassatum* (Fingerh.) Makino

Capsicum annuum f. *leucocarpum* Kuntze

Capsicum annuum f. *luteum* Kuntze

Capsicum annuum f. *nigrum* Makino

Capsicum annuum f. *pendulum* Makino

Capsicum annuum f. *violaceum* Kuntze

Capsicum annuum subsp. *abbreviatum* (Fingerh.) Arcang., 1882

Capsicum annuum subsp. *bicolor* Makino

Capsicum annuum subsp. *certoides* Fingerh.

Capsicum annuum subsp. *grossum* (L.) Sendtn.

Capsicum annuum subsp. *incrassatum* (Fingerh.) Makino

Capsicum annuum subsp. *microcarpon* Dierb.

Capsicum annuum var. *abbreviatum* Fingerh.

Capsicum annuum var. *cerasiforme* Irish

Capsicum annuum var. *conicum* (Lam.) Voss

Capsicum annuum var. *conoide* (Mill.) Irish

Capsicum annuum var. *conoides* (Mill.) Irish

Capsicum annuum var. *cordiforme* Edwall

Capsicum annuum var. *fasciculatum* (Sturtev.) Irish

Capsicum annuum var. *globiferum* (G.Mey.) Voss

Capsicum annuum var. *grossum* (Willd.) Sendtn.

Capsicum annuum var. *longum* (DC.) Sendtn.

Capsicum annuum var. *minimum* (Mill.) Heiser

Capsicum annuum var. *oblongoconicum* (Dunal) Cufod.

Capsicum annuum var. *parvoacuminatum* Makino

Capsicum axi Vell.

Capsicum baccatum Buch.-Ham.

Capsicum baccatum Buch.-Ham. ex Wall.

Capsicum baccatum Rodschied

Capsicum bauhini Dunal

Capsicum bicolor Jacq.

Capsicum caerulescens Besser

Capsicum cerasiforme Mill.

Capsicum cerasiforme Willd.

Capsicum ceratocarpum Fingerh.

Capsicum chamaecerasus Nees

Capsicum conicum G.Mey.

Capsicum conicum Lam.

Capsicum conoide Mill.

Capsicum conoideum Mill.

Capsicum conoideum var. *chordale* Fingerh.

Capsicum conoideum var. *oblongoconicum* Dunal

Capsicum conoideum var. *sulcatum* Fingerh.

Capsicum cordiforme Mill.

Capsicum crispum Dunal

Capsicum curvipes Dunal

Capsicum cydoniaeforme

Capsicum cydoniforme hort.

Capsicum cydoniforme hort. ex Roem. & Schult.

Capsicum dulce Dunal

Capsicum fasciculatum Sturtev.

Capsicum frutescens var. *cerasiforme* (Mill.) L.H.Bailey

Capsicum frutescens var. *conoides* (Mill.) L.H.Bailey

Capsicum frutescens var. *fasciculatum* (Sturtev.) L.H.Bailey

Capsicum frutescens var. *frutescens*

Capsicum frutescens var. *grossum* L.H.Bailey

Capsicum frutescens var. *longum* (Sendtn.) L.H.Bailey

Capsicum globiferum G.Mey.

Capsicum globosum Besser

Capsicum grossum L.

Capsicum grossum Willd.

Capsicum grossum var. *cerasiforme* (Mill.) C.B.Clarke

Capsicum hamiltonii G.Don

Capsicum hispidum Dunal

Capsicum indicum subsp. *elaeocarpon* Dierb.

Capsicum indicum var. *conoideum* (Mill.) Dierb.

Capsicum longum DC.

Capsicum luteum Lam.

Capsicum milleri Roem. & Schult.

Capsicum narunca Hort.Matr.

Capsicum narunca Hort.Matr. ex Dunal

Capsicum nigrum Willd.

Capsicum olivaeforme Mill.

Capsicum oliviforme Mill.

Capsicum ovatum DC.

Capsicum petenense Standl.

Capsicum pomiferum Mart.

Capsicum pomiferum Mart. ex Steud.

Capsicum purpureum Roxb.

Capsicum purpureum Vahl

Capsicum purpureum Vahl ex Hornem.

Capsicum pyramidale Mill.

Capsicum silvestre Vell.

Capsicum sphaerium Willd.

Capsicum tetragonum Mill.

Capsicum tomatiforme Fingerh.

Capsicum tomatiforme Fingerh. ex Steud.

Capsicum torulosum Hornem.

Capsicum tournefortii Besser

Capsicum ustulatum Paxton

Capsicum velutinum De Wild.

Capsicum velutinum DeWild.

Capsicum violaceum Desf.

Piper indicum Garsault

Common name: Cayenne pepper

Local name: Prik-Chi-Far

Family: Solanaceae

Distribution: In temperate and tropical regions of the world.

Parts Used: Fruit

Description of the Plant: Height and width: Plants average 18 inches high and 12 inches in diameter, but may grow to 2-3 feet in height in warmer regions with longer growing seasons. Habit: Herbaceous annual with compact upright growth habit. Maintains shape without pruning. Period of mature fruit display lasts 80-120 (140) days [209] .

Table 14-1 Traditional uses of *Capsicum annuum* Linn.

Traditional uses	Parts Used	Reference
Dyspepsia, flatulence, constipation, arthritis, menstrual cramps, gangrene, catarrhal affliction as in colds, cough, asthma and urinary catarrh.	Fruit	[210]

Table 14-2 Chemical constituents of *Capsicum annuum* Linn

Chemical constituents	Parts Used	Reference
P-coumaryl, caffeoyl, and 3,4-dimethoxycinnamoyl glucoside and of four flavonoid compounds	Fruit	[211]

Esters of capsorubin, capsanthin, cryptoxanthin, zeaxanthin and other carotenoids	Fruit	[212]

Table 14-3 Biological and pharmacological activities of *Capsicum annuum* Linn.

Activities	Parts Used	Reference
Antioxidant Activity	Fruit	[211, 212]
Antimicrobial, 135nti-inflammatory, cardio-protective, anti-carcinogenic	Fruit	[212]
Analgesic, antiangiogenic, antiparasitic, antiplatelet, anti-arthritic, antioxidant, antiviral, antifungal, antineoplastic, hypoglycemic, gastroprotective, and larvicidal effects.	Fruit	[210]
Stomach problems stomachic, carminative, stimulant, antispasmodic, analgesic, alterative, astringent, haemostatic, and antiseptic in nature	Fruit	[210]

Table 14-4 Toxicity assessment of *Capsicum annuum* Linn.

Toxicity assessment	Parts used	Results	References

Brine shrimp lethality assay (BSLA)	Fruit	The hydro-alcoholic extract showed LC50 value of 420 µg/ml.	[213]
MTT assay: Human hepatocellular carcinoma cell line (HepG2) cells.	Fruit	The ethanolic extract showed no cytotoxic effect after 24 and 48 h.	[214]
MTT assay: The human prostate cancer (PC-3) and the colon cancer (HTC116)	Pericarp	The Ethanol extracts showed The highest total content of phenolic compounds was found in an analogous fraction from hot pepper, and this fraction showed the strongest cytotoxic effect on the PC-3 tumour line.	[215]
Acute toxicity: Oral administration of Swiss albino mice at dose levels for ethanolic extracts were 3,500, 5000, 6500 and 8,000	Seed	The aqueous and ethanolic extracts showed LD50 values of 12043 and 5492mg/kg, respectively.	[216]

mg/kg and for aqueous extracts were 10,000, 12,000, 14,000 and 16,000 mg/ml.			

Leaf and Fruit [209]

Figure 23 of *Capsicum annuum* Linn.

15. *Capsicum frutescens* Linn.

Scientific name: *Capsicum frutescens* Linn.

Synonyms: *Capsicum annuum* var. *frutescens* (L.) Kuntze

Capsicum baccatum Vell.

Capsicum cereolum Bertol.

Capsicum comarim Vell.

Capsicum fastigiatum Blume

Capsicum frutescens Willd.

Capsicum frutescens var. *glabriusculum* (Dunal) M.R.Almeida

Capsicum frutescens var. *lanicaule* Greenm.

Capsicum frutescens var. *queenslandicum* Domin

Capsicum indicum Rumph.

Capsicum indicum var. *ribesium* Dierb.

Capsicum longum Bouton

Capsicum longum Bouton ex Dunal

Capsicum micranthum Link

Capsicum minimum Blanco

Capsicum minimum Roxb.

Capsicum odoratum Steud.

Capsicum odoriferum Vell.

Capsicum pendulum var. *majus* Dunal

Capsicum pendulum var. *minus* Fingerh.

Common name: Cayenne Pepper, Bird-chilli

Local name: Phrik-khinu

Family: Solanaceae

Distribution: Tropical and subtropical

Parts Used: Fruit

Description of the Plant: Annual or short-lived perennial herb. The stem of Capsicum frutescens almost striate, glabrous, highiet between 1-4 feet depending on climate and growing conditions. These fruits have range in color from green when immature to purple, red, orange or yellow when ripe [217].

Table 15-1 Traditional uses of *Capsicum frutescens* L

Traditional uses	Parts Used	Reference
Traditionally as an external therapy in painful muscle spasms in areas of shoulder, arm and spine; treating arthritis, neuralgia, lumbago and chilblains.	Not specify	[217]

diabetes, blood pressure [high/ low], bronchitis, burning feet, to increase circulation, relieve rheumatic pain, treat mouth sores and infected wounds, reduce blood clots, and aid digestion by stimulating saliva and gastric juice flow.		

Table 15-2 Chemical constituents of *Capsicum frutescens* L

Chemical constituents	Parts Used	Reference
Group of alkaloid compounds called capsaicinoids, capsanthin, capsorubin, cryptoxanthin, andzeaxanthin, which are present as fatty acid esters.	Fruit	[217]
Essential oils, alkaloids, glycosides, phenolic compounds were compounds, noncarotenoids, alcohols, hydrocarbons, hydroxycinnamic acid, flavonoids, lipoxygenase ascorbic acid, ester, derivatives, hydroxybenzoic acid, tannins, capsaicin, dihydrocapsaicin, capsiconinoid, capsinoid, carbonyls, terpenoids.	Not specify	

Table 15-3 Biological and pharmacological activities of *Capsicum frutescens* L

Activities	Parts Used	Reference

Anti-diabetic and Antioxidant	Flower	[218]
Antioxidant and Cytotoxic	Flower	[219]
Acaricidal activity, blocked the hatchability of eggs	Fruit, leaf	[220]

Table 15-4 Toxicity assessment of *Capsicum frutescens* L

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Fruit	The methanolic extracts showed LD50 value of 64.68 µg/ml.	[221]
MTT assay: The anti-proliferative activity of osteosarcoma cell lines (MG 63).	Seed	The silver nanoparticles of aqueous extract showed potential cytotoxic activity against the MG 63 cells with IC50 value of 60.42 µg/ml.	[222]
Toxicity evaluation: Cattle tick Rhipicephalus (Boophilus) microplus.	Fruit	The methanol extract showed acaricidal effective against adults with LC50 617.54 µg/ml and LC90 1040.41 µg/ml.	[223]

Acute toxicity: Oral administration of Swiss Webster albino mice.	Fruit	The results for groups of five Swiss Webster albino mice with single oral doses of three extract fractions were reported following: hexane fraction (200 mg/kg, death of all mice), chloroform fraction (200 mg/kg, death of all mice), and ethyl acetate fraction (200 mg/kg, death of all mice).	[224]

Figure 24 of *Capsicum frutescens* L. [225]

16. *Carica papaya* L.

Scientific name: *Carica papaya* L.

Synonyms: *Carica citriformis* J.Jacq. ex Spreng.

Carica citriformis Jacq.

Carica cubensis Solms

Carica hermaphrodita Blanco

Carica jamaicensis Urb.

Carica jimenezii (Bertoni) Bertoni

Carica mamaya Vell.

Carica papaya f. correae Solms

Carica papaya f. ernstii Solms

Carica papaya f. eupapaya Solms

Carica papaya f. mamaya (Vell.) Stellfeld

Carica papaya f. portoricensis (Urb.) Solms

Carica papaya subsp. *bady* Aké Assi

Carica papaya subsp. *portoricensis* Solms

Carica papaya var. *bady* Aké Assi

Carica papaya var. *jimenezii* Bertoni

Carica peltata Hook. & Arn.

Carica pinnatifida Heilborn

Carica portoricensis (Solms) Urb.

Carica posopora L.

Carica pyriformis Willd.

Carica rochefortii Solms

Carica sativa Tussac

Papaya bourgeaei (Solms) Kuntze

Papaya carica Gaertn.

Papaya cimarrona Sint.

Papaya cimarrona Sint. ex Kuntze

Papaya citriformis (Jacq.) A.DC.

Papaya communis Noronha

Papaya cubensis (Solms) Kuntze

Papaya cucumerina Noronha

Papaya edulis Bojer

Papaya edulis var. *macrocarpa* Bojer

Papaya edulis var. *pyriformis* Bojer

Papaya hermaphrodita Blanco

Papaya papaya (L.) H.Karst.

Papaya peltata (Hook. & Arn.) Kuntze

Papaya posopora (L.) DC.

Papaya pyriformis (Willd.) Baill.

Papaya rochefortii (Solms) Kuntze

Papaya sativa Tussac

Papaya vulgaris DC.

Vasconcellea peltata (Hook. & Arn.) A.DC.

Common name: Papaya

Local name: Malako

Family: Caricaceae

Distribution: Native to Central America, carried throughout the tropics

Parts Used: Leaf, Fruit, Seed

Description of the Plant: A multi-year tree, 3-6 m high, without succulent essence, with single white resin leaves arranged around the top, and they are often deeply lobed and often folded [226].

Table 16-1 Traditional uses of *Carica papaya* L.

Traditional uses	Parts Used	Reference
Improve cardiovascular system, protect Against heart diseases, heart attacks, strokes and prevent Colon cancer Improve cardiovascular system, protect Against heart diseases, heart attacks, strokes and prevent Colon cancer Improve cardiovascular system, protect against heart diseases, heart attacks, strokes and prevent colon cancer, prevention of diabetic heart disease.	Fruit	[227]
Boils, warts, freckles, abortion, expel roundworms, salt making, relieve asthma stomach troubles, purgative for horses, treatment for genito-urinary ailments, tumer destroying, making herbal tea, digestive and aid in chronic indigestion, weight loss, obesity, arteriosclerosis, high blood pressure, blood purifier and weakening of heart	Latex	[228]

Table 16-2 Chemical constituents of *Carica papaya* L.

Chemical constituents	Part of the plant	Reference
Piperidine alkaloids like carpaine, pseudocarpaine, dehydrocarpaine I and II and phenolics such as	Leaf	[229]

protocatechuic acid, p-coumaric acid, caffeic acid, 5,7-dimethoxycoumarin, chlorogenic acid, kaempferol and quercetin		
Proteinases such as papain, chymopapain A and B, and endopeptidase papain III and IV	Latex, and other in shrub	
Isothiocyanate	Seed	
Non-volatile organic acids	Fruit	
Cyanogenic compounds	Leaf, Stem, Fruits	

Table 16-3 Biological and pharmacological activities of of *Carica papaya* L.

Activities	Part of the plant used	Reference
Antimalarial, anti-proliverative against prostate cancer, antifungal activity, antibacteria, antidengue, anti-inflamatory	Leaf	[230]
Antibacterial	Root, Seed	[231]
Antioxidant	Leaf	[232]
Pancreatic Lipase Inhibitor	Seed	[233]
Gastroenteritis, uretritis, otitis media, typhoid fever and wound infections	Root	[231]

Antimalarial	Leaf	[234]
Antioxidant	Leaf	[232]

Table 16-4 Toxicity assessment of *Carica papaya* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	Ethanolic extract, ethyl acetate fraction, chloroform fraction, and hexane fraction showed LC50 values of 204.17 µg/ml, 66.07 µg/ml, 204.7 µg/ml and 562.34 µg/ml, respectively	[235]
MTT assay: Against Human oral squamous cell carcinoma (SCC25) and Non-cancerous human keratinocyte (HaCaT) cells.	Leaf	The supercritical fluid (scCO2) extract was cytotoxic against SCC25 and HaCaT cell lines at LC50 values of 88.07 and 120.60 µg/mL, respectively	[236]
Acute toxicity: Oral administration of female mice at a dose range of 50 – 5,000 mg/Kg for 24 hours.	Unripe fruit	The aqueous extract did not cause death in all doses but induced hepatic steatosis and steatohepatitis at doses of 4,000 and 5,000 mg/kg.	[233]

Sub-acute toxicity: Oral administration of Sprague Dawley rats at doses of 0.01, 0.14 and 2 g/kg for 28 days.	Leaf	The extract (juice without addition of water) did not cause mortality and investigation parameters (such as clinical signs, hematological parameters, or histopathology changes) showed non-significant differences between treatment and control groups.	[227]

Fruit with seeds

Figure 25 of *Carica papaya* L. [237]

17. *Cassia alata* (L.) Roxb.

Scientific name: *Cassia alata* (L.) Roxb.

Synonyms: *Senna alata* (L.) Roxb.

Cassia alata L.

Cassia herpetica Jacq.

Herpetica alata (L.) Raf.

Common name: Candle bush

Local name: Chum-hed-thed

Family: Fabaceae/Leguminosae

Distribution: Central America and is mainly Caribbean, many tropical countries

Parts Used: Leaf

Description of the Plant: Annual or biannual shrub with a nasty smell, 1–4 m tall, preferring sunny and moist areas. The leaf yellowish-green, broad, with 5–14 leaflet

pairs, the distal ones often larger and with a notched apex. The fruit is a 10–16 × 1.5 cm tetragonal pod, winged on the angles, brown when ripe and containing lots of (up to 60) diamond-shaped brown seeds [238].

Table 17-1 Traditional uses of *Cassia alata* (L.) Roxb.

Traditional uses	Parts Used	Reference
Hepatitis, skin diseases, jaundice, gastroenteritis, intestinal helminthiasis, eczema, and ringworm	Leaf, stem, bark	[239]
Constipation and food poisoning.	Leaf	
Rheumatism and laxative	Root	[240]
Fungicides and medicine for eczema	Leaf and seed	

Table 17-2 Chemical constituents of *Cassia alata* (L.) Roxb.

Chemical constituents	Parts Used	Reference
The major constituents are linalool (23.0%), borneol (8.6%), pentadecanal (9.3%) and α-terpineol (5.9%)	Leaf	[238]
Alkaloids, saponins, steroids, flavonoids and terpenoid	Leaf	[240]

Table 17-3 Biological and pharmacological activities of *Cassia alata* (L.) Roxb.

Activities	Parts Used	Reference
Anti-infectious properties, Antibacterial and antifungal	Not specify	[238]

Anti-inflammatory, antimutagenic, analgesic, antidiabetic, antifungal and antimicrobial properties	Leaf	[241]

Table 17-4 Toxicity assessment of Carica papaya L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf and seed	The ethanolic extract showed LC50 value of 4.31 µg/ml for seed and 5.29 µg/ml for leaf.	[242]
MTT assay: HT-115 cell (human colon cancer), human mesenchymal stem (hMSCs) and Vero (normal monkey kidney cell) cells.	Flower	The methanolic extract showed did not shown significant inhibitory effect in normal cells neither Vero cells nor hMSCs.	[243]
Acute toxicity: Oral administration of Swiss albino mice	Leaf	The ethanol and methanol extracts showed practical non-toxic.	[244]

Whole plant with leaf and flower

Figure 26 of *Cassia alata* (L.) Roxb.[238]

18. *Centella asiatica* (L.) Urb.

Scientific name: *Centella asiatica* (L.) Urb.

Synonyms: *Centella asiatica* var. *boninensis* (Nakai ex Tuyama) Hara

Centella asiatica var. *crispata* (Maxim.) Yabe

Centella asiatica var. *cristata* Makino

Centella boninensis Nakai ex Tuyama

Centella bupleurifolia (A. Rich.) Adamson

Chondrocarpus asiaticus (L.) Nutt.

Glyceria asiatica (L.) Nutt.

Hydrocotyle artensis Montr.

Hydrocotyle asiatica var. *crispata* Maxim.

Hydrocotyle asiatica var. *hebecarpa* (DC.) Hassk.

Hydrocotyle asiatica var. *lunata* (Lam.) Pers.

Hydrocotyle asiatica var. *pedunculata* Kuntze

Hydrocotyle asiatica var. *subrepanda* Blume

Hydrocotyle asiatica var. *subsessilis* Kuntze

Hydrocotyle brevipedata St. Lag.

Hydrocotyle dentata A. Rich.

Hydrocotyle ficarifolia Stokes

Hydrocotyle ficarioides Lam.

Hydrocotyle hebecarpa DC.

Hydrocotyle inaequipes DC.

Hydrocotyle indivisa Banks & Soland. ex Hook. fil.

Hydrocotyle lunata Lam.

Hydrocotyle lurida Hance

Hydrocotyle nummularioides A. Rich.

Hydrocotyle sarmentosa Salisb.

Hydrocotyle thunbergiana Spreng.

Hydrocotyle wightiana Wall.

Trisanthus cochinchinensis Lour.

Centella coriacea Nannf.

Hydrocotyle asiatica L.

Common name: Indian pennywort, Asiatic pennywort

Local name: Bua-bok

Family: Apiaceae/ Umbelliferae

Distribution: Tropical & Subtropical areas

Parts Used: Leaf, Stem, Aerial parts

Description of plant: Small perennial creeping plant [1-2,7]. long of pericardial petioles. The flowers are small (less than 3 mm, 0.12 in) with round three to four flowers, that of white, red, pink, or purple color[245].

Table 18-1 Traditional uses of *Centella asiatica* (L.) Urb.

Traditional uses	Parts Used	Reference
Encephalopathy	Leaf	[246]
Traumatic injuries Keloid and scar	Not specify	[247]
Insanity, asthma, leprosy, ulcers and eczema and for wound healing	Leaf	[248]
Healing various types of wounds, including stomach ulcers, and the skin lesions present in leprosy	Leaf	[249]
Alzheimer's disease	Leaf	[250]
Treatment of cancer	Leaf	[251]
Diuretic and tonic	Not specify	[252]
Antipyretic and wound healing	Not specify	[253]

Table 18-2 Chemical constituents of *Centella asiatica* (L.) Urb.

Chemical constituents	Part used	Reference
Madecassoside	Not specify	[247]
Pentacyclic triterpenes, Which includes asiaticoside, madecassoside, asiatic acid, and madecassic acid	Not specify	[252, 253]

Madecassoside, asiaticoside, madecassic acid and asiatic acid	Leaf	[254]
Asiaticosides	Leaf	[249]
Phenolic compounds	Leaf, Root, Petiole	[255]
Isothankuniside and thankuniside	Leaf	[250]

Table 18-3 Biological and pharmacological activities of *Centella asiatica* (L.) Urb.

Activities	Part used	Reference
Antipyretic, wound healing, anti-wrinkle, and anti-inflammation	Not specify	[253]
Anti-stress, antidepressant, anxiolytic and anti-seizure properties	Not specify	[253]
Anti-ageing, and restructuring as well as for treating stretch marks vascular and nervous disorders	Leaf	[249]
Antibacterial	Leaf Not specify	[251, 252] [249]
Anti-oxidant	Leaf, Petiole, Root,Leaf	[246, 249, 250, 252, 254-256]
Anti-inflammatory, anti-ulceration	Not specify	[247, 257]

Ulcer, wound and burns healing, depression and anxiety, as well as venous insufficiency and microangiopathy Anti-lipid		
Neuroprotective Anti-hyperglycemic	Leaf	[246]
Anti-inflammatory, memory enhancing, collagen synthesizing and anticancer activity	Not specify	[252]
Anti-lipid peroxidative, anticonvulsant	Not specify	[247, 252]
Anti-depressant, protective effect against myocardial ischemia-reperfusion injury	Not specify	[247]
Antitumor	Leaf	[254, 256]
Anti-rheumatoid, wound healing	Leaf	[254]
Anti-Alzheimer, antifungal, antifertility	Leaf	[250]
Antimicrobial	Leaf	[251]

Table 18-4 Toxicity assessment of *Centella asiatica* (L.) Urb.

Toxicity assessment	Parts Used	Results	References
MTT assay: Murine leukemia cells (P388).	Whole plant	Both essential oils and ethanol extracts showed no	[228]

		cytotoxic activity against P388.	
MTS assay: The anti-proliferative activity of human lung cancer cells (A549) and normal fibroblast (IMR90).	Leaf	The aqueous extract showed IC50 value of 5.75 ± 1.0 µg/ml for A549 but no cytotoxic effects on IMR90.	[258]
Brine shrimp lethality assay (BSLA)	Leaf	LD50 of 840 µg/ml for aqueous extract, 765 µg/ml for chloroform extract and >1000 µg/ml for ethanolic extract.	[259]
Acute toxicity: Oral administration of ICR mices at a dose of 10 g/kg. Sub-chronic toxicity: Oral administration of Wistar rats at the doses of 10, 100, and 1000 mg/kg.	ECa 233 (a standardized extract water-insoluble extrac of C. asiatica, a white powder containing triterpenoid	Acute toxicity study: ECa 233 in the dose up to 10.0 g/kg produced no acute toxicity. Sub-chronic toxicity: no significant sub-chronic toxicity was observed at dose range of 10-1,000 mg/kg.	[260]

	glycosides not less than 80% with a ratio of madecassoside to asiaticoside of 1.5 ± 0.5:1)		
Acute toxicity: Oral administration of Sprague-Dawley rats at a dose range of 0–2000 mg/kg. Sub-chronic toxicity: Oral administration of Sprague-Dawley rats at the doses of 250, 500, and 1000 mg/kg.	Leaf	Standard extract Acute toxicity study: LD50 > 2000 mg/kg, no deaths occurred during the 14-day posttreatment evaluation period. Sub-chronic toxicity: no deaths occurred during the 90-day evaluation period and no observable adverse effect level is 1000 mg/kg.	[259]

Figure 27 of *Centella asiatica* (L.) Urb. [260]

19. *Cinnamomum camphora* (L.) J.Presl

Scientific name: *Cinnamomum camphora* (L.) J.Presl

Synonyms: *Camphora camphora* (L.) H.Karst.

Laurus camphora L.

Common name: Compgor, Laurel Camphor, Gum Camphor, Formosan Camphor

Local name: Karabun

Family: Lauraceae

Distribution: Caribbean, north America, Oceania

Parts Used: Bark, Wood

Description of the Plant: A sizeable perennial plant, 9 m high, 25-45 in., Glossy, smooth surface, green, single leaves, smooth, glossy, green throughout the year, 5-15 cm long and thick, with pointed leaves, colored flowers. Small greenish-white or yellowish clustered along the crotch area, pink or purple-brown fruit, small fruit in one fruit, one seed.

Table 19-1 Traditional uses of *Cinnamomum camphora* (L.) J.Presl

Traditional uses	Parts Used	Reference
Relief of pain and inflammation in joints and muscles, helps to sedative, anti-inflammatory, and anti-ischemic properties	Leaf	[261, 262]

Inflammation-related diseases, including rheumatic arthritis, muscular strains, abdominal pain, rheumatism, cough and bronchitis	aerial part	[263]

Table 19-2 Chemical constituents of *Cinnamomum camphora* (L.) J.Presl

Chemical constituents	Parts Used	Reference
linalol, trans-caryophyllene alpha-humulene, nerolidol, 1,5-heptadien-4-one, 3,3,6-trimethyl acetic acid 2-propanol, 1-chloro, phosphate phytol, ethyl linoleolate	Not specify	[264]
glycosides, saponins, flavonoids, steroids, tannins, alkaloids, terpenes	Not specify	[265]
phenylpropanoid, lignans, flavonoids, coumarin, and terpenoid. volatile oil, lignans, glycosides	Not specify	[266]

Table 19-3 Biological and pharmacological activities of *Cinnamomum camphora* (L.) J.Presl

Activities	Parts Used	Reference
Alleviate allergic skin inflammatory	Leaf	[261]
Anti-inflammatory	The aerial parts Leaf	[262], [263]

Anti-tyrosinase and antioxidant activity	Leaf	[266]
Antioxidant, anti-helminthic, antifungal, and antibacterial activities, reduction of body fat deposition and improvement of blood lipids,	The aerial parts	[263]

Table 19-4 Toxicity assessment of *Cinnamomum camphora* (L.) J.Presl

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	The essential oils showed LC50 value of 2.5±2.5 µg/ml.	[267]
EZ-cytox-enhanced cell viability assay: Human adult low-calcium high-temperature (HaCaT) keratinocyte cell.	Leaf	The ethanolic extract did not exhibit cytotoxicity to HaCaT cells at the assayed concentrations of 12.5, 25, 50, and 100 µg/ml.	[261]
MTT assay: RAW 264.7 murine macrophages.	Aerial parts	Both of two constituents ((+)-Episesaminone and 3S-(+)–9-oxonerolidol) from the ethanolic extract had no significant cytotoxicity to RAW 264.7 macrophages at concentrations under 100 µM.	[263]

Cell viability assay (CCK-8 kit): HaCaT cells.	Leaf	The essential oil had no significant cytotoxicity effect at concentrations below 0.5 μg/ml.	[262]
Acute toxicity: Oral administration of ICR mices at a dose of 20 ml/kg.	Leaves and branches	The essential oil showed low toxicity to female mice (2749 mg/kg), but nontoxic to male mice (5081 mg/kg).	[267]

A: Whole plant B: leaf

Figure 28 of *Cinnamomum camphora* (L.) J.Presl [268]

20. *Cinnamomum verum* J. Presl.

Scientific Name : *Cinnamomum verum* J. Presl.

Synonyms : *Cinnamomum verum* J. Presl.

Cinnamomum verum J. Presl in Berchtold & J. Presl, Prir.

Laurus cinnamomum Linnaeus, Sp.

Cinnamomum zeylanicum Blume.

Family: Lauraceae

Common Name: True cinnamon tree, Ceylon cinnamon tree

Local Name: Op-choei

Distribution: South Asia and South East Asia

Parts Used: Bark

Description of the Plant: An evergreen tree that reaches a height of 8-17 m in the wild. In an unharvested state, the trunk is stout, 30-60 cm in diameter, with a thick, grey bark and the branches set low down. Fruit a fleshy ovoid drupe, black, 1.5-2 cm long when ripe, with the enlarged calyx at the base [269].

Table 20-1 Traditional uses of *Cinnamomum verum* J. Presl.

Traditional uses	Parts Used	Reference
Asthma, bronchitis, diarrhea, headache, inflammation and cardiac disorders.	Bark	[270]

Table 20-2 Chemical constituents of *Cinnamomum verum* J. Presl.

Chemical constituents	Parts Used	Reference
Monoterpenes, diterpenes, sesquiterpenes, oxygenated hydrocarbons and polyphenols	Bark	[270]
Cinnamaldehyde, cinnamates, cinnamic acid and natural Eos, EOs contain a great variety of volatile natural compounds, such as trans-cinnamaldehyde, eugenol, cinnamyl acetate, L-borneol, ß-caryophyllene, caryophyllene oxide, L-bornyl acetate, a-thujene, a-terpineol, a-cubebene, terpinolene and E-nerolidol	Not specify	[271]

Table 20-3 Biological and pharmacological activities of *Cinnamomum verum* J. Presl.

Activities	Parts Used	Reference
Antioxidant, antimicrobial, anti-inflammatory, anticancer, antidiabetic, wound healing, anti-HIV, anti-anxiety and antidepressant	Bark	[270]
Anticancer, antioxidant and antibacterial	Bark	[272]

Table 20-4 Toxicity assessment of *Cinnamomum verum* J. Presl.

Toxicity assessment	Parts Used	Results	References

Brine shrimp lethality assay (BSLA)	Whole plant, leaf, flower, bulb, root etc.	The ethanolic extract of leaf and bark showed LC50 values of 196 and 75.5 µg/m, respectivelyl.	[273]
XTT assay: Human lung squamous cell carcinoma NCI-H520 cells.	Cuminaldehyde (CuA; a constituent of the bark)	Purchased CuA inhibited cell proliferation in NCI-H520 cells with an IC50 value of 33.29 µM.	[274]
Acute toxicity: Oral administration of Wistar albino rats) at different doses of 10, 100, 1000, 1500, 2500, 3500 and 5000 mg/kg for 24 h.	Bark	The aqueous extract showed nontoxic with LD50 greater than 5000 mg/kg body weight.	[275]

Bark Leaves Fruits

Figure 29 of *Cinnamomum verum* J. Presl. [270]

21. *Citrus aurantifolia* Swingle

Scientific name: *Citrus aurantifolia* Swingle

Synonyms: *Citrus × acida* Pers.

Citrus × acida Roxb.

Citrus × aurantiifolia subsp. *murgetana* García Lidón & al.

Citrus aurantiifolia subsp. *murgetana* García Lidón, D. Rivera, S. Ríos & Obón

Citrus aurantium subsp. *aurantiifolia* (Christm.) Guillaumin

Citrus × aurantium var. *lima* (Macfad.) Guillaumin

Citrus × davaoensis (Wester) Yu.Tanaka

Citrus depressa var. *voangasay* Bory

Citrus × excelsa Wester

Citrus × excelsa var. *davaoensis* Wester

Citrus hystrix subsp. *acida* Engl.

Citrus × javanica Blume

Citrus × lima Macfad.

Citrus × limettioides Yu.Tanaka

Citrus × limonellus Hassk.

Citrus × macrophylla Wester

Citrus medica var. *acida* Brandis

Citrus medica f. aurantiifolium (Christm.) M.Hiroe

Citrus × montana (Wester) Yu.Tanaka

Citrus × nipis Michel

Citrus × notissima Blanco

Citrus × papaya Hassk.

Citrus × pseudolimonum Wester

Citrus × spinosissima G.Mey.

Citrus × voangasay (Bory) Bojer

Citrus × webberi var. *montana* Wester

Limonia × aurantiifolia Christm.

Common name: Lime, Common lime

Local name: Ma-nao

Family: Rutaceae

Distribution: Tropics and in warm subtropical areas

Parts Used: Fruit, Leaf

Description of the Plant: An evergreen, spiny shrub or small tree up to 6 m tall. The leaves are yellow-green to dark green, and, upon crushing, release a strong citrus odor and taste. The fruits (hesperidiums) are ellipsoidal, 3–5cm in diameter, have juicy, greenish-yellow flesh, and become yellow when mature [276].

Table 21-1 Traditional uses of *Citrus aurantifolia* Swingle

Traditional uses	Parts Used	Reference
Cough reliever	Fruit	[277]

Antipyretic, stomachic and as cold remedy	fruit, leaves, root and bark	[278]
stomach ache	Leaf	[279]
Influenza, insomnia, as a cardiovascular analeptic, anti-spasmodic, for cold, sedative, digestive	Flower	[280]
Boils and urinary tract infections.	Root	

Table 21-2 Chemical constituents of *Citrus aurantifolia* Swingle

Chemical constituents	Parts Used	Reference
Monoterpene, hydrocarbons, Sesquiterpene, hydrocarbons, Oxygenated monoterpenes, Oxygenated sesquiterpenes, Monoterpene aldehydes, Monoterpene alcohols, Monoterpene ketones, Monoterpene esters, Sesquiterpene alcohols, Aliphatic aldehydes	Not specify	[276]
α-Thujene, α-Pinene, Camphene Sabinene, β-Pinene Myrcene, Octanal, α-Phellandrene α-Terpinene, p-Cymene Limonene, (E)-β-Ocimene γ-Terpinene, cis-Sabinene hydrate Terpinolene, Linalool, trans-Sabinene hydrate Nonanal, exo-Isocitral Camphor, Citronellal Borneol, cis-Pinocamphone Isogeranial	fruit	

β-pinene (12.6%), limonene (53.8%), γ-terpinene (16.5%), terpinolene (0.6%), α-terpineol (0.4%) and citral (2.5%),	Not specify	[276]

Table 21-3 Biological and pharmacological activities of *Citrus aurantifolia* Swingle

Activities	Parts Used	Reference
Antimicrobial, spasmolytic, antimicrobial, neuroprotective and neuromodulating, antinociceptive, antioxidant, chemopreventive and skin sensitizing activity	Fruit	[276]
Antioxidant Capacity, and Hypolipidemic	Fruit	[277]
Antibacterial Activity Antifungal Activity	Whole plant	[280]

Table 21-4 Toxicity assessment of *Citrus aurantifolia* Swingle

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Fruit, Leaf, Stem bark	Citrus limon stem bark (LC50=10.0±0.33) and C. limon leaf (LC50= 5.0±0.74 µg/mL) methanolic extracts were observed to be strongly cytotoxic	[278]

		compared to cyclophosphamide (LC50=98.76±0.15 µg/mL), while the other extracts were either non, weakly, or moderately toxic in BSL assay	
MTT assay: Rhabdomysarcoma (Rd), laryngeal carcinoma (Hep-2c) and a normal cell line (Vero)		The methanolic extract of seed, stem bark, leaf and juice showed Citrus aurantifolia leaf extract (CC50=4.02±2.85 µg/mL, CC50=5.45±2.8 µg/mL) retained a comparable cytotoxicity to cyclophosphamide (CC50=2.23±0.14 µg/ mL, CC50=2.66±0.8 µg/mL) on Rd and Hep-2c human cancer cell lines, respectively. The other extracts exhibited varying degrees of cytotoxicity	
Sulforhodamine B Assay (SRB): Human breast	Leaf	Both ethanolic extract and aqueous extract showed IC50 values >50 µg/ml on MCF-7, T47D	[281]

adenocarcinoma (MCF-7), mammary gland, ductal carcinoma (T47D), human cervical adenocarcinoma (HeLa) and human keratinocyte cells (HaCaT).		and HeLa cells but no toxicity on HaCat cells.	
Acute toxicity: Oral administration of rat at doses of 10, 100, 1000, 1600, 2900 and 5000 mg/kg.	Stem bark	The methanolic extract showed no sign of toxicity and mortality at all concentrations.	[282]

A: Whole plant [283] B: Leaf and Flower [284] C: Fruit [284]

Figure 30 of *Citrus aurantifolia* Swingle

22. *Citrus hystrix* DC.

Scientific name: *Citrus hystrix* DC.

Synonyms: *Citrus aurantium* subsp. *saponacea* Saff.

Citrus auraria Michel

Citrus balincolong (Yu.Tanaka) Yu.Tanaka

Citrus boholensis (Wester) Yu.Tanaka

Citrus celebica Koord.

Citrus celebica var. *southwickii* (Wester) Swingle

Citrus combara Raf.

Citrus combara var. *boholensis* (Wester) Yu.Tanaka

Citrus combara var. *macroptera* (Montrouz.) Yu.Tanaka

Citrus combara var. *micrantha* (Wester) Yu.Tanaka

Citrus combara var. *southwickii* (Wester) Tanaka

Citrus echinata St.-Lag.

Citrus hyalopulpa Hayata

Citrus hyalopulpa Yu.Tanaka

Citrus hystrix var. *annamensis* (Yu.Tanaka) Guillaumin

Citrus hystrix var. balincolong Yu.Tanaka

Citrus hystrix var. *boholensis* Wester

Citrus hystrix var. *micrantha* (Wester) Merr.

Citrus hystrix var. microcarpa (Wester) Merr.

Citrus hystrix var. *southwickii* (Wester) Merr.

Citrus hystrix var. *torosa* (*Blanco*) Wester

Citrus kerrii (Swingle) Tanaka

Citrus latipes Hook.fil. *& Thomson* ex Hook.fil.

Citrus macroptera Montrouz.

Citrus macroptera var. *annamensis* Tanaka

Citrus macroptera var. *boholensis* (Wester) Yu.Tanaka

Citrus macroptera var. *combara* (Raf.) Tanaka

Citrus macroptera var. *kerrii* Swingle

Citrus macroptera var. *micrantha* (Wester) Yu.Tanaka

Citrus macroptera var. *southwickii* (Wester) Yu.Tanaka

Citrus micrantha Wester

Citrus micrantha var. *balincolong* Wester

Citrus micrantha var. *microcarpa* Wester

Citrus papeda Miq.

Citrus papuana F.M.Bailey

Citrus southwickii Wester

Citrus torosa Blanco

Citrus tuberoides J.W.Benn.

Citrus ventricosa Michel

Citrus vitiensis Tanaka

Citrus Westeri Yu.Tanaka

Citrus xaurantium var. *saponacea* var. *saponacea* Saff.

Citrus xbergamia var. *unguentaria* var. *unguentaria* M.Roem.

Citrus xbergamia var. *ventricosa* var. *ventricosa* (Michel) M.Roem.

Fortunella sagittifolia K.M.Feng & P.Y.Mao

Papeda rumphii Hassk.

Common name: Kaffir lime

Local name: Makrood

Family: Rutaceae

Distribution: Southeast Asia

Parts Used: Fruit, Leaf

Description of the Plant: A thorny bush, with aromatic and distinctively shaped "double" leaves. These hourglass-shaped leaves comprise the leaf blade plus a flattened.

Table 22-1 Traditional uses of *Citrus hystrix* DC.

Traditional uses	Parts Used	Reference
Maintaining healthy teeth and gums and as a remedy for scurvy	Leaf	[285]
Used to treat stomach ache caused by dyspepsia and insect bites; also, the rind has been prescribed for treatment for worms and headache	Leaf	[286]

Table 22-2 Chemical constituents of *Citrus hystrix* DC.

Chemical constituents	Parts Used	Reference
major components: Sabinene, β-pinene, D-limonen, citronellal and terpinen-4-ol, citronellal (66.9%) and âcitronellol (6.6%)	Peel	[286]
Nerolidol , Citronellal , Citronellol , Linalool , Isopulegol	Leave or fruit	[287]
Cymene, D-Limonene, y-Terpinene, Terpinolene, Linalool, Isopulegol, Citronellal, Citronellol	Fruit	[288]

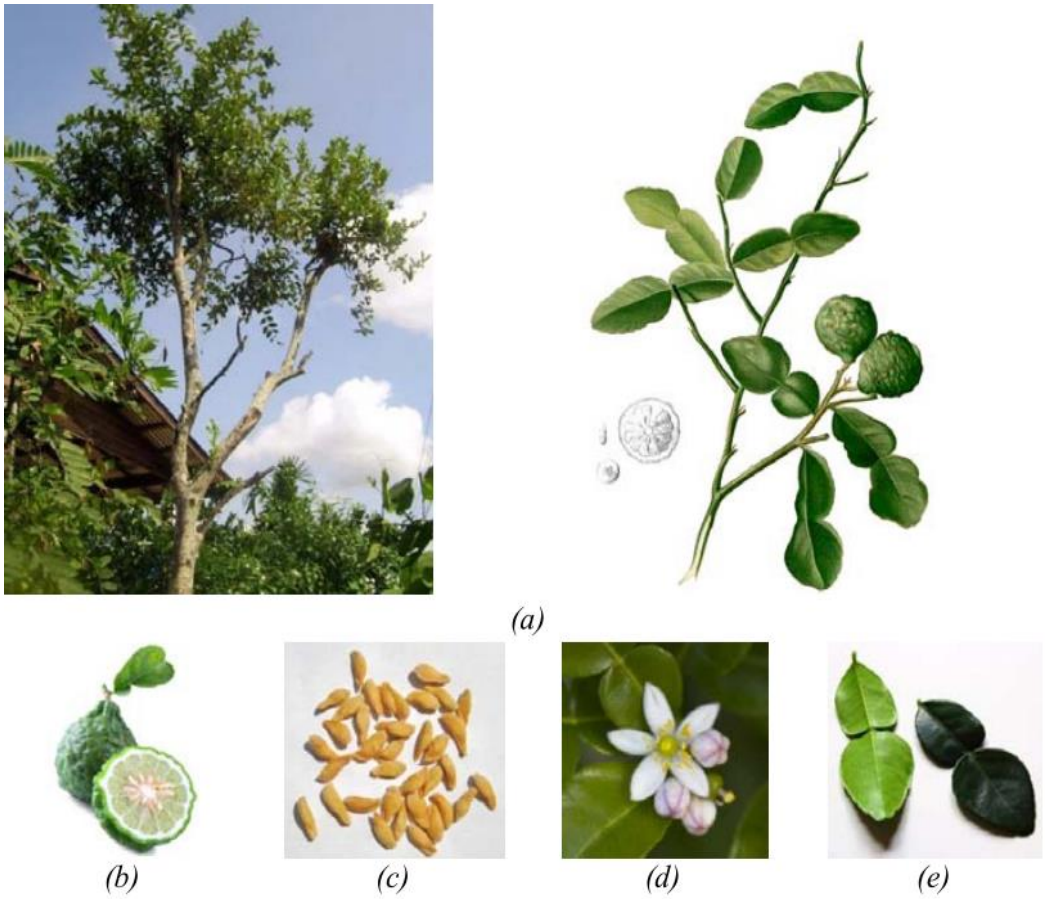
Table 22-3 Biological and pharmacological activities of *Citrus hystrix* DC.

Activities	Parts Used	Reference
Anti-inflammatory, antioxidant, anti-cancer	Leaf	[285]
Antioxidant, antimicrobial, anti-proliferative	Leaf	[289]
Antibacterial, antioxidant, and anticancer	Essential Oil	[287]
Antioxidant	Leaf	[290]
Antibacterial	Peel	[288]
Antifertility, Tyrosinase inhibitory activity and Cardioprotective effect	Peel	[286]

Table 22-4 Toxicity assessment of *Citrus hystrix* DC.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Fruit	The LC50 were found to be 0.80 ± 0.09, 1.12±0.03, 1.92 ± 0.07, 3.84 ± 0.13 and 3.20 ± 0.04 µg/ml for methanol crude extract, n-hexane, carbon tetrachloride, dichloromethane and aqueous soluble materials, respectively.	[291]

MTT assay: cervical cancer cell line (HeLa cells)	Leaf	lC50 values of ethanolic, ethyl acetate and hexane extract were 82,034 µg/ml, 57,845 µg/ml and 203,992 µg/ml, respectively.	[292]
MTT assay: breast cancer cells (T47D) and Vero cells	Seed	IC50 values of all callus extracts with ethyl acetate were above 1000 µg/mL in both T47D breast cancer cells and Vero cells.	[293]
Acute toxicity: Oral administration of mice at doses of 1000, 2500, and 5000 mg/kg for 24 hrs.	Fruit	LD50 of methanolic extract was more than 5000 mg/kg body weight and no death was observed during the treatment period.	[294]



a: Whole plant b: Fruit c: seed d: flower e: leaf

Figure 31 of *Citrus hystrix* DC.[286]

23. *Citrus maxima* (Burm.) Merr.

Scientific name: *Citrus maxima* (Burm.) Merr.

Synonyms: *Aurantium decumanum* (L.) Mill.

Aurantium maximum Burm.fil.

Citrus costata Raf.

Citrus decumana (L.) L.

Citrus grandis f. buntan Hayata

Citrus grandis var. *kotokan* (Hayata) Karaya

Citrus grandis var. *oblonga* Hassk.

Citrus grandis var. *pyriformis* (Hassk.) Karaya

Citrus grandis var. *racemosa* (Roem.) B.C.Stone

Citrus grandis var. *sabon* (Seibert ex Hayata) Karaya

Citrus grandis var. *sabon* (Siebold ex Hayata) Hayata

Citrus grandis var. *sphaerocarpos* Hassk.

Citrus grandis var. *yamabuki* (Yu.Tanaka) Karaya

Citrus kotokan Hayata

Citrus kwangsiensis Hu

Citrus maxima (Burm.) Merr.

Citrus maxima (Burm.fil.) Osbeck

Citrus medica subsp. *pyriformis* (Hassk.) Hiroë

Citrus obovoidea Takahashi

Citrus obovoidea hort.

Citrus obovoidea hort. ex *Tanaka*

Citrus pampelmos Risso

Citrus pompelmos Risso

Citrus pyriformis Hassk.

Citrus sabon Siebold

Citrus sabon Siebold ex Hayata

Citrus yamabuki Yu.Tanaka

Citrus xaurantium f. grandis f. grandis (L.) M.Hiroe

Citrus xaurantium subsp. *decumana* subsp. *decumana* (L.) Tanaka

Citrus xaurantium subsp. *grandis* subsp. *grandis* (L.) Hiroë

Citrus xaurantium var. *decumana* var. *decumana* L.

Citrus xaurantium var. *grandis* var. *grandis* L.

Common name: Pomelo

Local name: Som-o

Family: Rutaceae

Distribution: Indian subcontinent

Parts Used: Leaf, Fruit

Description of the Plant: Medium-sized tree but the largest of all Citrus species, with large leaves, flowers, and fruits. The tree is 5-15 m tall, Young branchlets angular, often densely soft, short, hairy, and usually with spines [295].

Table 23-1 Traditional uses of *Citrus maxima* (Burm.) Merr.

Traditional uses	Parts Used	Reference
Relieve joint pain, flatulence, tightness, and headache.	Leaf	[296]

Fruits juice can be used as a febrifuge, a kind of medicine exert its function in reducing the fever		
Juice can be used as a febrifuge; a kind of medicine exert its function in reducing the fever; cardio-tonic; preventing constipation problem and improve digestion and peristalsis, appetizer, cardiac stimulant, stomach tonic and also as a remedy for fever, insomnia and sore throat	Fruit	
Curing the coughs and dyspepsia	Seed	

Table 23-2 Chemical constituents of *Citrus maxima* (Burm.) Merr.

Chemical constituents	Parts Used	Reference
Neo-hesperidin, hesperidin, naringenin, naringin; polyphenols, flavonoids, ascorbic acid	Fruit	[297]
Alkaloids, Saponins, Terpenoids, Anthraquinones, Glycosides Tannins, Flavonoids, Carbohydrates	Peel	[298]
Carotenoid, especially lycopene	Fruit	[299]

Table 23-3 Biological and pharmacological activities of *Citrus maxima* (Burm.) Merr.

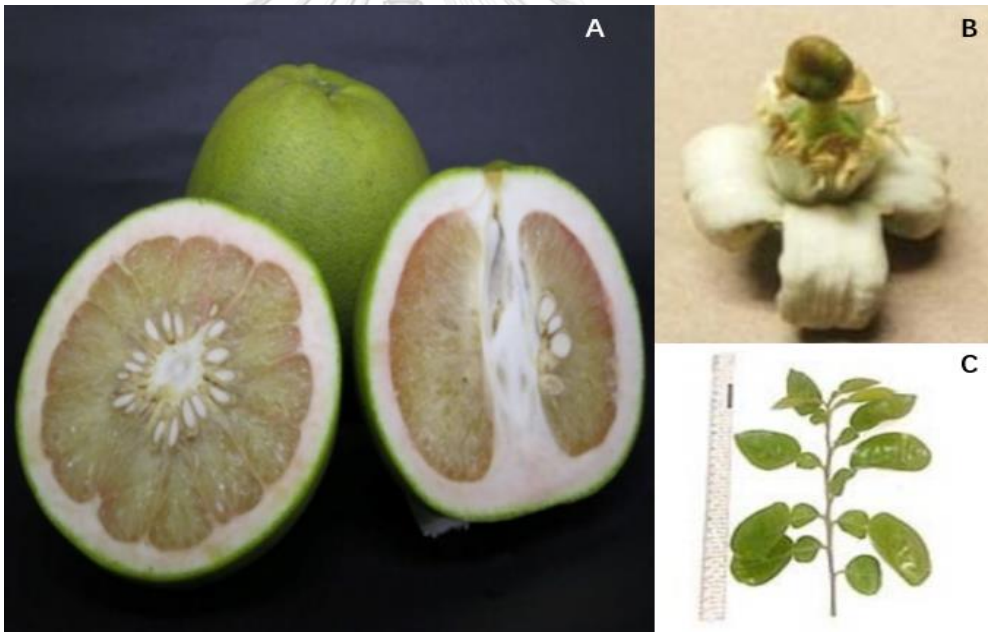
Activities	Parts Used	Reference
Antioxidant	Not specify, Peel, Fruit	[296-298, 300]

Antimicrobial	Peel	[298]
Anti-inflammatory, antidiabetic, anti-glycation, anti-obesity, anti-tumour	Fruit	[296]
A-glucosidase-inhibitory activities and antioxidant activities	Peel	[301]

Table 23-4 Toxicity assessment of *Citrus maxima* (Burm.) Merr.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	Methanolic and ethanolic extracts showed toxicity with LC50 values of 80.46 and 105.59 µg/ml, respectively.	[302]
MTT assay: Cell viability test for RINm5F cells.	Fruit	Ethanolic extracts from different parts and the waste blanching water showed the minimum suppressing dose varied according to the species of grapefruit from ≥0.5 µg/ml to ≥5 µg/ml.	[303]
Subacute toxicity: Oral administration of Long Evans rats at a dose of 250, 500 and 1000 mg/kg for 21 days.	Fruit	Methanolic extract showed no pathological change of the vital organ indicating that pomelo is nontoxic and safe.	[297]

		there was no significant change in the body weight, percentage water content, and relative organ weight at any administered doses.	



A: Fruit[303] B: Flower C: Leaf [295]

Figure 32 of *Citrus maxima* (Burm.) Merr.

24. *Clinacanthus nutans* (Burm.f.) Lindau

Scientific name: *Clinacanthus nutans* (Burm.f.) Lindau

Synonyms: *Justicia nutans* Burm.f.

Common name: Sabah snake grass

Local name: Phaya-yo

Family: Acanthaceae

Distribution: South-east Asia

Parts Used: Leaf

Description of the Plant: The species is an annual shrub that can grow up to 1 3 meters tall. It has green cylindrical, smooth and striated stems[304].

Table 24-1 Traditional uses of *Clinacanthus nutans* (Burm.f.) Lindau

Traditional uses	Parts Used	Reference
Snake bites, insect and scorpion stings	Leaf	[304]

Table 24-2 Chemical constituents of *Clinacanthus nutans* (Burm.f.) Lindau

Chemical constituents	Parts Used	Reference
Terpens-Tripenoids, Terpenes-Phytosterols, Phenolic compounds, Sulfur-containing glycosides compounds, Sulfur containing compounds	Not specify	[304]
Vitexin, isovitexin, shaftoside, isomollupentin 7-O-b-glucopyranoside, orientin and isorentin	Leaf and stem	[305]

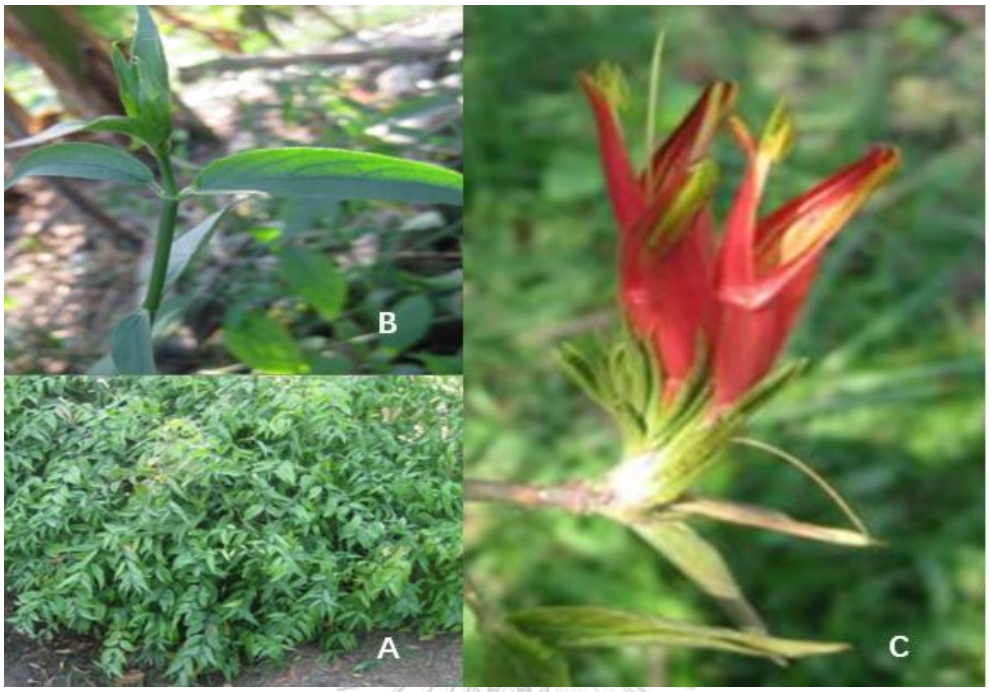
Table 24-3 Biological and pharmacological activities of *Clinacanthus nutans* (Burm.f.) Lindau

Activities	Parts Used	Reference
Antioxidant	Leaf	[304, 305]
Anti-venom	Not specify	[304]
Anti-cancer, anti-inflammatory and anti-viral		

Table 24-4 Toxicity assessment of *Clinacanthus nutans* (Burm.f.) Lindau

Toxicity assessment	Parts Used	Results	References
MTT assay, macerated using ethanol 70% solvent in a ratio of 1:10 for 5 days, and was re-macerated for 2 days. The extracts were then fractionated with ethyl acetate solvent in a ratio of 1:1.	Whole plant	Weak toxicity with a selectivity index of 4.740, indicating that Clinacanthus nutans L. Ethyl acetate fraction is less toxic against T47D breast cancer cells but selective against Vero normal cells.	[306]
Ethanolic extracts , Brine shrimp lethality test	Leaf	Ethanolic extract of C. Nutans leaves are classified as nontoxic.	[305]

Acute oral toxicity, methanolic extracts, male Swiss albino mice at doses 900 and 1800 mg/kg.	Not specify	The results showed that no mortality and or side effects on liver, kidney, spleen, lung and heart were observed. In addition, Sprague Dawley male rats administered orally with methanolic leaf extracts of C. nutans at doses of 300, 600 and 900 mg/kg also showed no abnormality or toxicological effects on liver and kidney functions	[304]



A: Whole plant B: leaf C: flower

Figure 33 of *Clinacanthus nutans* (Burm.f.) Lindau [307]

25. *Coccinia grandis* (L.) J. Voigt

Scientific name: *Coccinia grandis* (L.) J. Voigt

Synonyms: *Bryonia grandis* L.

Coccinia cordifolia

Coccinia indica Wight & Arn.

Common name: Ivy Gourd

Local name: Tam-lueng

Family: Cucurbitaceae

Distribution: Southern Indian states

Parts Used: Leaf, Fruit

Description of the Plant: A slender, soft, hairless, glabrous, branched, annual, and perennial herb growing to 50 cm tall cultivated all over India[308].

Table 25-1 Traditional uses of *Coccinia grandis* (L.) J. Voigt

Traditional uses	Parts Used	Reference
Treat diabetes	Not specify	[309]
Microbial infections, gastrointestinal disorders, inflammation and also DM	Not specify	[310]
Leprosy, jaundice, asthma, bronchitis, skin eruptions, burns, tongue sores, earache, indigestion, eye infections, nausea, insect bites, and fever	Fruits, roots, the stem	[311]

Table 25-2 Chemical constituents of *Coccinia grandis* (L.) J. Voigt

Chemical constituents	Parts Used	Reference
Essential amino acids, polyunsaturated fatty acids, total phenolics, vitamin C	Fruit	[312]
Phenols, tannins, saponins, terpenoids, and flavonoids	Leaf	[311]

Table 25-3 Biological and pharmacological activities of *Coccinia grandis* (L.) J. Voigt

Activities	Parts Used	Reference
Pro-inflammatory	Leaf	[313]
Anti-Diabetic	Leaf	[310]
Anti-hepatotoxic, Anti-hyperlipidemic, Anti-insecticidal, Antioxidant	Not specify	[311]
Antioxidant	Leaf	[314]
Anti-diabetic, anti-ulcer, anti-inflammatory, anti-oxidant, and anti-tumor	Not specify	[313]

Table 25-4 Toxicity assessment of *Coccinia grandis* (L.) J. Voigt

Toxicity assessment	Parts Used	Results	References

Brine shrimp lethality assay (BSLA)	Leaf	The methanolic extract showed LC50 value of 15.97 ± 0.101 mg/ml.	[315]
Brine shrimp lethality assay (BSLA)	Leaf	The ethanolic extract showed LC50 value of 24.20 µg/ml.	[316]
MTT assay: Murine macrophage cell line (RAW 264.7)	Leaf	The ethanolic extract showed no cytotoxicity on RAW 264.7 which more than 90% macrophages remained viable up to 90 µg/ml of plant extract concentration.	[317]
Cytotoxicity Assay	Leaf	Extract dissolved in phosphate buffer saline (PBS), lower cytotoxicity on the murine RAW 264.7 macrophage cell line	[313]
Acute toxicity: Oral administration of male Wister albino rats at doses of 5, 50, 300, 2000 mg/kg and higher doses for 14 days.	Leaf	The ethanol extract showed no signs of acute toxicity up to a dose level of 3.2 g/kg and no lethality or any toxic reactions were found up to the end of the study period.	[318]

Fruit, Leaf and Flower

Figure 34 of *Coccinia grandis* (L.) J. Voigt [311]

26. *Cocos nucifera* L.

Scientific name: *Cocos nucifera* L.

Synonyms: *Cocos nucifera* var. *synphyllica* Becc.

Palma cocos Mill.

Cocos indica Royle.

Cocos nana Griff.

Calappa nucifera (L.) Kuntze

Common name: Coconut

Local name: Ma-prao

Family: Arecaceae

Distribution: Asia and Pacific

Parts Used: Coconut water, Oil, Husk Fiber, Pulp, Root

Description of the Plant: The plant is an arborescent monocotyledonous tree of around 25 m in height (giant coconut) with a dense canopy. The root of the coconut system is fasciculate. and with an oily pulp consistency and a liquid albumen called coconut water that is thick, sweet, and slightly acidic [319]

Table 26-1 Traditional uses of *Cocos nucifera* L.

Traditional uses	Parts Used	Reference
Oral asthma treatment	Husk fiber	[319]
Skin care, kidney diseases	Not specify	[320]

Urinary problems, gallstones, and hematemesis	Not specify	[321]

Table 26-2 Chemical constituents of *Cocos nucifera* L.

Chemical constituents	Parts Used	Reference
Lupeol-methylether	leaf	[319]
Skimmiwallin	leaf	
Isoskimmiwallin	leaf	
Catechin	Fiber	
Flavonoid	Fiber, Root, Inflorescence	
Saponin	Root	
a-tocopherol	oil	
Tannins	Fiber Inflorescence	
Vitamin C	Liquid albumen	
Liquid acid	Oil	
L-arginine	Liquid albumen Solid albumen	

Table 26-3 Biological and pharmacological activities of *Cocos nucifera* L.

Activities	Parts Used	Reference
Anthelmintic	Husk fiber	[322]
Anti-bacterial	Fruit	[319]
Anti-inflammatory	Husk fiber, fruit	[319], [321]
Anti-hyperglycemic	Flower	[319]
Anti-malarial	Husk fiber	[322]
Anti-oxidant	Fruit	[323]
Anti-trichomoniasis	Not specify	[319]
Hepatoprotective	Coconut water	[319]
Renal protective	Not specify	[320]
Anti-hypertensive and Vasorelaxant	Endocarp	[319]
Antinociceptive	Husk fiber, Root	[319]
Antipyretic	Fruit	[321]
Analgesic, and antipyretic	Fruit	[321]
Anti-neoplastic	Husk fiber	[324]
Amenorrhea and dysmenorrhea,	Bark	[319]

Table 26-4 Toxicity assessment of *Cocos nucifera* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Endocarp	The LC50 of hydro-alcohol and methanol extract were 432.35 µg/ml and 1173.88 µg/ml respectively.	[325]
MTT assay: Cell viability assay on Hela cells	shell	IC50 value was found to be 1.77mg/mL. The MTT assay revealed the crude extract toxicity upon HeLa cells	[326]
Acute toxicity: Oral administration of Swiss albino mice at doses of 500, 1000, 2000, 3000, 4000 and 5000 mg/kg for 14 days.	Inflorescence flower	The LD50 value of acetone extract was >5000 mg/kg and no mortality of animal.	[327]

Figure 35 of *Cocos nucifera* L. [328]

27. *Colocasia esculenta* (L.) Schott

Scientific name: *Colocasia esculenta* (L.) Schott

Synonyms: *Alocasia dussii* Dammer

Alocasia illustris W.Bull

Aron colocasium (L.) St.-Lag.

Arum chinense L.

Arum colocasia L.

Arum colocasioides Desf.

Arum esculentum L.

Arum lividum Salisb.

Arum nymphaeifolium (Vent.) Roxb.

Arum peltatum Lam.

Caladium acre R.Br.

Caladium antiquorum (Schott) André

Caladium atrovirens André

Caladium colocasia (L.) W.Wight

Caladium colocasioides (Desf.) Brongn.

Caladium divaricatum André

Caladium esculentum (L.) Vent.

Caladium esculentum subsp. *bataviensis* Hovey

Caladium glycyrrhizum Fraser

Caladium nigrescens André

Caladium nymphaeaefolium Vent.

Caladium nymphaeifolium Vent.

Caladium parimaense André

Caladium violaceum Desf.

Caladium violaceum Engl.

Caladium violaceum var. *alboviolaceum* André

Calla gaby Blanco

Calla virosa Roxb.

Cladium colocasia (L.) W.Wight

Colocasia acris (R.Br.) Schott

Colocasia aegyptiaca Samp.

Colocasia antiquorum Schott

Colocasia antiquorum f. acris (R.Br.) Schott

Colocasia antiquorum f. acuatica Makino

Colocasia antiquorum f. eguimo Makino

Colocasia antiquorum f. esculenta (L.) Schott

Colocasia antiquorum f. euchlora (K.Koch & Linden) Schott

Colocasia antiquorum f. nymphaeifolia (Vent.) Schott

Colocasia antiquorum f. oyasetage Makino

Colocasia antiquorum f. purpurea Makino

Colocasia antiquorum f. typica Engl.

Colocasia antiquorum f. yamamotoi Makino

Colocasia antiquorum var. *acris* (R.Br.) Schott

Colocasia antiquorum var. *aquatilis* (Hassk.) Engl. & K.Krause

Colocasia antiquorum var. *esculenta* (L.) Schott

Colocasia antiquorum var. *esculenta* (L.) Schott ex Seem.

Colocasia antiquorum var. *euchlora* (K.Koch & Linden) Schott

Colocasia antiquorum var. *euchlora* (K.Koch & Sello) Schott ex Engl.

Colocasia antiquorum var. *globulifera* Engl. & K.Krause

Colocasia antiquorum var. *illustris* (W.Bull) Engl.

Colocasia antiquorum var. *multifolia* Makino

Colocasia antiquorum var. *nymphaeifolia* (Vent.) Engl.

Colocasia antiquorum var. *patens* Makino

Colocasia antiquorum var. *rosea* Makino

Colocasia antiquorum var. *rupicola* Haines

Colocasia antiquorum var. *stolonifera* Haines

Colocasia antiquorum var. *typica* Engl

Colocasia colocasia (L.) Huth

Colocasia colocasia infrasubsp. publ

Colocasia esculenta f. ebiimo Makino

Colocasia esculenta f. rotundifolia Makino

Colocasia esculenta var. *acris* (R.Br.) A.F.Hill

Colocasia esculenta var. *antiquorum* (Schott) F.T.Hubb. & Rehder

Colocasia esculenta var. *aquatilis* Hassk.

Colocasia esculenta var. *esculenta*

Colocasia esculenta var. *euchlora* (K.Koch & Linden) A.F.Hill

Colocasia esculenta var. *globulifera* (Engl. & K.Krause) R.A.Young

Colocasia esculenta var. *illustris* (W.Bull) A.F.Hill

Colocasia esculenta var. *nymphaeifolia* (Kunth) A.F.Hill

Colocasia esculenta var. *rupicola* (Haines) H.B.Naithani

Colocasia esculenta var. *stolonifera* (Haines) H.B.Naithani

Colocasia esculenta var. *typica* A.F.Hill

Colocasia euchlora K.Koch & Linden

Colocasia formosana Hayata

Colocasia gracilis Engl.

Colocasia himalensis Royle

Colocasia konishii Hayata

Colocasia neocaledonica Van Houtte

Colocasia nymphaeifolia (Vent.) Kunth

Colocasia peltata (Lam.) Samp.

Colocasia tonoimo Nakai

Colocasia vera Hassk.

Colocasia virosa (Roxb.) Kunth

Colocasia vulgaris Raf.

Leucocasia esculenta (L.) Nakai

Steudnera virosa (Roxb.) Prain

Zantedeschia virosa (Roxb.) K.Koch

Common name: Cocoyam

Local name: Phueak

Family: Araceae

Distribution: Humid tropics and subtropic

Parts Used: Root, Gum/latex

Description of the Plant: A perennial herbaceous plant, with large spherical corm from which a few heart-shaped leaves emerge at the tip on long petiole reaching 1-2m heights [329].

Table 27-1 Traditional uses of *Colocasia esculenta* (L.) Schott

Traditional uses	Parts Used	Reference
Painful rheumatic joint, to treat tuberculosis and pulmonary congestion.	Tuber (Root)	[330]
Juice of the leaf is stimulants and rubefacient as well as a styptic. It's also useful in internal otalgia, adenitis, hemorrhages, and buboes.	Leaf	[329]

Juice is demulcent, laxative, and anodyne	Corm	

Table 27-2 Chemical constituents of *Colocasia esculenta* (L.) Schott

Chemical constituents	Parts Used	Reference
Alkaloids, glycosides, flavonoids, terpenoids, saponins and phenols.	Tuber	[330]

Table 27-3 Biological and pharmacological activities of *Colocasia esculenta* (L.) Schott

Activities	Parts Used	Reference
Super antioxidants, anti-inflammatory	Tuber	[330]
Anticancer, antihyperlipidaemic, anxiolytic, wound healing, antimelanogenic, anti-inflammatory, probiotic, antihypertensive, antidiabetic, hepatoprotective, antiinflammatory, antimicrobial, hypolipidaemic, antihelminthic	Not specify	[329]

Table 27-4 Toxicity assessment of *Colocasia esculenta* (L.) Schott

Toxicity assessment	Parts Used	Results	References

Brine shrimp lethality assay (BSLA)	Leaf	The ethyl acetate fraction showed LC50 value lower than 1000 µg/ml.	[331]
MTT assay: Five different cancer cell lines; human lung cancer (A549), ovarian cancer (Pa-1), prostate cancer (PC3), colon cancer (HCT 116), and acute leukemia (K562).	Leaf	The ethanolic extract showed LC50 values of 93.2 µg/ml, 133.6 µg/ml, 172.87 µg/ml, 217.54 µg/ml, and 223.08 µg/ml for Pa-1, A549, HCT116, K562, and PC-3 cell, respectively.	[332]
Sub-acute toxicity: Oral administration of	Leaf	The aqueous extract at doses lower than 1000 mg/kg may not exert toxic effects on haematological and some biochemical parameters but may exert selective toxicity in few visceral organs.	[333]

Figure 36 of *Colocasia esculenta* (L.) Schott [329]

28. *Coriandrum sativum* L.

Scientific name: *Coriandrum sativum* L.

Synonyms: *Bifora loureiroi* Kostel.

Coriandropsis syriaca H.Wolff

Coriandrum diversifolium Gilib.

Coriandrum globosum Salisb.

Coriandrum majus Garsault

Coriandrum majus Gouan

Coriandrum melphitense Ten. & Guss.

Coriandrum sativum subsp. *asiaticum* Stolet.

Coriandrum sativum subsp. *indicum* Stolet.

Coriandrum sativum subsp. *vavilovii* Stolet.

Coriandrum sativum var. *afghanicum* Stolet.

Coriandrum sativum var. *africanum* Stolet.

Coriandrum sativum var. *anatolicum* Stolet.

Coriandrum sativum var. *arabicum* Stolet.

Coriandrum sativum var. *asiaticum* Stolet.

Coriandrum sativum var. *indicum* Stolet.

Coriandrum sativum var. *microcarpum* DC.

Coriandrum sativum var. *pygmaeum* Stolet.

Coriandrum sativum var. *vavilovii* Stolet.

Selinum coriandrum (Vest) E.H.L.Krause

Sium coriandrum Vest

Sium coriaudrum Vest

Sium testiculatum Vest

Common name: Coriander, Chinese-parsley

Local name: Phak-chi

Family: Apiaceae/ Umbelliferae

Distribution: Native to European-Mediterranean, currently planted all over the world [308].

Parts Used: Whole plant

Description of the Plant: There are two varieties of Coriandrum sativum L.: vulgare and microcarpum. Vulgare is a taller plant with larger leaves and fruits than microcarpum [308].

Table 28-1 Traditional uses of *Coriandrum sativum* L.

Traditional uses	Parts Used	Reference
As an expectorant laxative. Cure measles or rash, sweating, expelling wind, flatulence, a traditional medicine to treat disorders of the digestive, respiratory and urinary systems, as well as diabetes, inflammation, insomnia, anxiety, convulsion, and other conditions	whole plant	[308]

Loss of appetite, convulsion, insomnia, and anxiety	whole plant	[334]

Table 28-2 Chemical constituents of *Coriandrum sativum* L.

Chemical constituents	Parts Used	Reference
Tocopherol, Total tocopherols Sterol, Cholesterol Campesterol, Stigmasterol β-Sitosterol	Fruit	[308]
Linalool, geranyl acetate, 2-decenoic acid, (2E)-dodecenol (17.8%), decanal (15.3%), and (2E)-decenol (11.9%)	Not specify	[335]
Dihydroxyphenolic acid, gallic acid, ferulic acid, caffeic acid, chlorogenic acid, syringic acid, vanillic acid, p-coumaric acid, rosmarinic acid, cinnamic acid, quercetin-3-rhamnoside, luteolin, coumarin, quercetin, rutin, apigenin and amentoflavone	whole fruit, Seed And Pericarp	[336]

Table 28-3 Biological and pharmacological activities of *Coriandrum sativum* L.

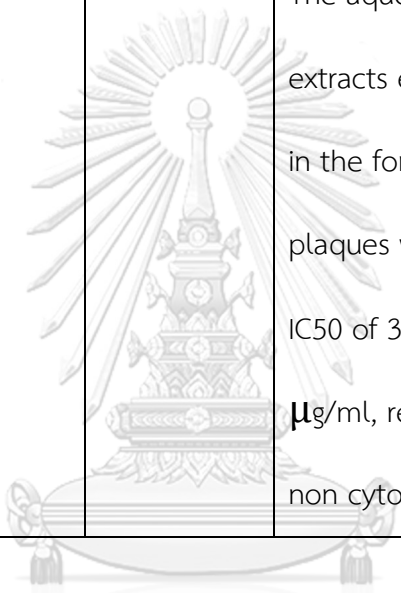
Activities	Parts Used	Reference
Antioxidant, Antimicrobial	Not specify, Seed, Fruit	[308, 337, 338], [334, 336, 339]

Immune–modulatory, antioxidant, anti–inflammatory, anticancer	Not specify	[340]
Antioxidant, Antimicrobial Antibiofilm	Not specify	[341]
Anti-proliferative, Anxiolytic, antidepressant, sedative hypnotic, anticonvulsant, memory enhancement, neuroprotective, antibacterial, antifungal, anthelmintic, insecticidal, antioxidant, cardiovascular	Not specify	[335]
Antibacterial, antidiabetic and anticancerous, antimutagenic	Not specify	[334]

Table 28-4 Toxicity assessment of *Coriandrum sativum* L.

Toxicity assessment	Parts Used	Results	References
MTT assay in three human tumor cell lines (Caco-2, CCRF-CEM and CEM/ADR 5000)	Aerial parts	Essential oil. cytotoxic activity against Caco-2, CCRF-CEM and CEM/ADR 5000 tumor cell lines with IC50 values of 86.8, 16.5 and 38.5 µg/mL, respectively	[335]
MTT assay : Vero cells and the inhibition of HepG2 cells	Seed	Hexane and aqueous extracts exhibited inhibition of vero cells with CC50 of 600 µg/ml	[342]

		and 700 µg/ml, respectively, while the minimum inhibition of HepG2 cells was observed at a concentration of 350 µg/ml for the three extracts. The aqueous and hexane extracts exhibited reductions in the formation of HSV-1 plaques with an observed IC50 of 350 µg/ml and 250 µg/ml, respectively non cytotoxic.	



A: Seed B: Leaf and flower C: Whole plant

Figure 37 of *Coriandrum sativum* L. [343]

29. *Cuminum Cyminum* L.

Scientific name: *Cuminum Cyminum* L.

Synonyms: *Cuminum* L.

Cumimum cyminum L.

Cuminia cyminum J.F.Gmel.

Cuminum aegyptiacum Mérat

Cuminum aegyptiacum Mérat ex DC.

Cuminum cyminum subsp. *hispanicum* (Mérat ex DC.) Lange

Cuminum hispanicum Bunge, 1852

Cuminum hispanicum Mérat

Cuminum hispanicum Mérat ex DC.

Cuminum odorum Salisb.

Cuminum officinale Garsault

Cuminum sativum J.Sm.

Cuminum sudanense H.Wolff

Cyminon longeinvolucellatum St.-Lag.

Ligusticum cuminum (L.) Crantz

Luerssenia cyminum (L.) Kuntze

Selinum cuminum (L.) E.H.L.Krause

Family: Apiaceae/ Umbelliferae

Common name: Cumin

Local name: Tian-khao

Distribution: Mediterranean Region

Parts Used: Whole plant

Description of the Plant: Annual herbs, up to 50 cm tall; stems slender, glabrous.

Leaves bi-or tripinnate, with ciliate ultimate segments, ca. 2-5 cm longe; vittae large.

Table 29-1 Traditional uses of *Cuminum Cyminum* L.

Traditional uses	Parts Used	Reference
Treat hoarseness, jaundice, dyspepsia and mixed with other ingredients to treat diarrhea and colic	Not specify	[344]
toothache, diarrhea, epilepsy, dyspepsia, and jaundice	Seed	[345]

Table 29-2 Chemical constituents of *Cuminum Cyminum* L.

Chemical constituents	Parts Used	Reference
Alkaloid, anthraquinone, coumarin, flavonoid, glycoside, protein, resin, saponin, tannin and steroid	Whole plant	[344]
Organic acids (aspartic, citric, malic, tartaric, propionic, ascorbic, oxalic, maleic and fumaric acids), carotenes, zeaxanthin and lutein	Seed	

Table 29-3 Biological and pharmacological activities of *Cuminum Cyminum* L.

Activities	Parts Used	Reference
Antibacterial	Seed	[344]
Antioxidant	Seed	[345]
Antifungal	Seed	[345, 346]

Table 29-4 Toxicity assessment of *Cuminum Cyminum* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Fruit	Ethyl acetate and hexane fractions demonstrated LC50 of 52.40 and 60.77 µg/ml.	[347]
MTT assay: L929 mouse fibroblasts.	Seed	There were no significant differences between the cytocompatibility of different concentrations of cumin essential oil and co-trimoxazole at its full concentration (700 µg/ml) on L929 fibroblasts.	[348]

MTT assay: J774 macrophage cell line.	Seed	The aqueous extract did not show any toxic effects on J774 macrophage cells.	[349]
Acute toxicity: Oral administration of mice at a single dose of 2000 mg/kg for 24 h.	Seed	The essential oil caused no death and no sign of toxicity.	[350]

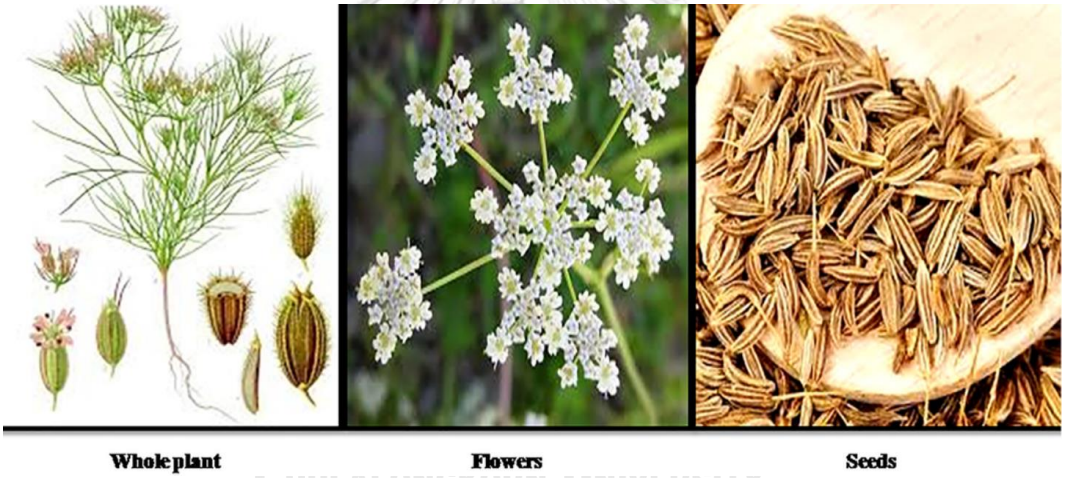


Figure 38 of *Cuminum Cyminum* L. [351]

30. *Curcuma longa* L.

Scientific name: *Curcuma longa* L.

Synonyms: *Amomum curcuma* Jacq.

Amomum curcuma Murray

Curcuma brog Valeton

Curcuma domestica L.

Curcuma domestica Valeton

Curcuma longa var. *vanaharidra* Velay., Pandrav., J.K.George & Varapr.

Curcuma ochrorhiza Valeton

Curcuma soloensis Valeton

Curcuma tinctoria Guibourt

Kua domestica Medik.

Stissera curcuma Giseke

Stissera curcuma Raeusch.

Vurcuma longa var. *vanaharidra* Velay

Common name: Turmeric, Indian-saffron

Local name: Khamin

Family: Zingiberaceae

Distribution: Southeast Asia

Parts Used: Rhizome

Description of the Plant: Turmeric is a sterile plant and does not produce any seeds. The plant grows up to 3-5 ft tall and dull yellow flowers. The rhizome is an underground stem that is thick and fleshy ringed with the bases of old leaves is part of turmeric which possesses a potential medicinal property [352].

Table 30-1 Traditional uses of *Curcuma longa* L.

Traditional uses	Parts Used	Reference
Leishmaniasis, bacterial and viral infections	Rhizome	[353]
Antiseptic, disinfectant, anti-inflammatory, and analgesic	Rhizome	[352]
Disorders including indigestive and liver ailments disorders, throat infections, common colds, wound and skin sores	Not specify	[354]
Stimulant for liver and gallbladder promotes bile production and drainage of gallbladder, against gallstones; lowers cholesterol; against cellulitis	Rhizome	[126]

Table 30-2 Chemical constituents of *Curcuma longa* L.

Chemical constituents	Parts Used	Reference
Anthocyanins, Phenols, Tannins	Rhizome	[352]
Turmero saccharides	Rhizome	[355]

Curcumin, Demethoxycurcumin, Bisdemethoxy curcumin	Rhizome	[356]
Turmerol, Turmerone, Curcumone, Cineole, Camphene, d-alpha-pinene	Rhizome	[126]

Table 30-3 Biological and pharmacological activities of *Curcuma longa* L.

Activities	Parts Used	Reference
Anti-Inflammation, Antioxidants, Antiapoptotic, Neuroprotective, Hepatoprotective, Antidepressant, Anticonvulsant, Immunoprotection, Antitumor, Antiviral, Antibacterial, Insecticidal, Antifungal	Rhizome	[357]
Anti-Tumor, Antimicrobial, Anti-Inflammatory, Wound Healing, Gastroprotective Activities	Rhizome	[358]
Antioxidant	Rhizome	[359]

Table 30-4 Toxicity assessment of *Curcuma longa* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Rhizome	Methanol extract, Lc50 valued 62.10 µg/mL, Curcuma longa	[360]

		can be inferred to have very strong toxic effect.	
Neutral red cytotoxicity assay: Human hepatocellular carcinoma HepG2 cell line.	Rhizome	The IC50 value of methanolic extract was 196.12 ± 3.98 µg/ml, while the IC50 value of pure curcumin was 41.69 ± 2.87 µg/ml.	[361]
Sub-chronic toxicity: Oral administration of Wistar rats at the doses of 250, 500, and 1000 mg/kg for 90 days.	Rhizome	NR-INF-02 (a standardized extract containing turmerosaccharides) administered at all doses did not show any mortality or clinical signs of toxicity in rats.	[355]
90-Day Subchronic Oral Toxicity Study in Rats	Rhizome	NR-INF-02 (NR-INF-02 is a standardized extract containing turmerosaccharides from Curcuma longa), no-observed adverse effect level (NOAEL) was found to be	[355]

		1000 mg/kg body weight in albino Wistar rats.	

A: Whole plant B: Root C: Rhizome

D: Flower

Figure 39 of *Curcuma longa* L. [362]

31. *Cyathula prostrata* (L.) Blume

Scientific name: *Cyathula prostrata* (L.) Blume

Synonyms: *Achyranthes alternifolia* L.fil.

Achyranthes debilis Poir.

Achyranthes diffusa Moench

Achyranthes globosa Pers.

Achyranthes mollis Lepr.

Achyranthes mollis Lepr. ex Seub.

Achyranthes prostrata L.

Achyranthes repens B.Heyne ex Roth

Cyathula alternifolia (L.fil.) Druce

Cyathula geniculata Lour.

Cyathula globosa (Pers.) Moq.

Cyathula prostrata subsp. *debilis* Moq.

Cyathula prostrata var. *debilis* (Poir.) Miq.

Cyathula prostrata var. *debilis* (Poir.) Moq.

Cyathula prostrata var. *prostrata*

Cyathula repens Moq.

Cyathula sanguinolenta Moq.

Cyathula semirosulata Masam.

Desmochaeta globosa (Pers.) Roem. & Schult.

Desmochaeta micrantha DC.

Desmochaeta patula Wall.

Desmochaeta prostrata (L.) DC.

Desmochaeta repens Roem. & Schult.

Pupalia prostrata (L.) Mart.

Common name: Pigweed

Local name: Ya-phun-ngoo-dang

Family: Amaranthaceae

Distribution: Pantropical regions

Parts Used: Aerial parts

Description of the Plant: An annual, branched herb/shrub reaching up to 1m with stem trails on the ground and bears leaves which are rhomboid-oblong and adhesive fruits [363].

Table 31-1 Traditional uses of *Cyathula prostrata* (L.) Blume

Traditional uses	Parts Used	Reference
As natural therapeutic agents against some multidrug resistant bacteria and they could prevent pathogenic diseases.	Not specify	[364]
Scabies	Leaf	[365]

Applied to sores and cancers and used as eardrop for otitis and headache	Sap	

Table 31-2 Chemical constituents of *Cyathula prostrata* (L.) Blume

Chemical constituents	Parts Used	Reference
Tannins, Saponins, flavonoids, Alkaloids, phenolic, Anthraquinone and glycosides	Not specify	[365]
Terpenoids, Tannins, Flavonoids, Saponins, Cardiacglycoside, Steroids, Alkaloids	Leaf, stem bark, Root	[363]

Table 31-3 Biological and pharmacological activities of *Cyathula prostrata* (L.) Blume

Activities	Parts Used	Reference
Antibacterial	Fruit	[364]
Anti-ulcer and antioxidant	Whole plant	[365]
Gastroprotectective		
Anti-inflammatory and analgetic		

Table 31-4 Toxicity assessment of *Cyathula prostrata* (L.) Blume

Toxicity assessment	Parts Used	Results	References

MTT assay: The anti-proliferative activity of HeLa (cervix adenocarcinoma) cell line.	Whole plant	The potentially cytotoxic of ethanolic extracts on HeLa cell line showed over 50% activity at 500 µg/ml.	[366]
CellTiter-Blue assay: Cervical (HeLa) cancer, human promonocytic leukaemia U937cells and normal peripheral blood mononuclear cells (PBMCs).	Whole plant	The IC50 values of ethanolic extract for HeLa and U937 cells were 100.8 µg/ml and 64.43 µg/ml respectively. Cytotoxicity of the plant extract was not evident when treating normal PBMCs cells.	[367]
Acute toxicity: Oral administration of Swiss albino mice at a dose of 20 g/kg for 24 hours.	Not specify	The LD50 value of the aqueous extract was higher than 20 g/kg.	[368]

Whole plant [369]

Figure 40 of *Cyathula prostrata* (L.) Blume

32. *Cymbopogon citratus* (DC.) Stapf

Scientific name: *Cymbopogon citratus* (DC.) Stapf

Synonyms: *Andropogon cerifer* Hack.

Andropogon ceriferus Hack.

Andropogon citratus DC.

Andropogon citratus DC. ex Nees

Andropogon citriodorus Desf. [Invalid]

Andropogon nardus subsp. *ceriferus* (Hack.) Hack.

Andropogon nardus var. *ceriferus* (Hack.) Hack.

Andropogon roxburghii Nees ex Steud.

Common name: Lemon Grass; Lapine

Local name: Ta-khrai

Family: Gramineae

Distribution: Tropical Asia and Africa

Parts Used: Stems, leaves, roots

Description of the Plant: Leaves that are light green in color, are narrower (~1.4 cm) and shorter (~95 cm) and its bush grows to a height of ~130 cm [370].

Table 32-1 Traditional uses of *Cymbopogon citratus* (DC.) Stapf

Traditional uses	Parts Used	Reference
Sleep aid, tranquilizer, digestive,	Leaf	[371]
Insect repellents	Not specify	[370]

Table 32-2 Chemical constituents of *Cymbopogon citratus* (DC.) Stapf

Chemical constituents	Part used	Reference
Neral, geranial, limonene, citronellal, myrcene, and geraniol	Leaf	[372]

Table 32-3 Biological and pharmacological activities of *Cymbopogon citratus* (DC.) Stapf

Activities	Part of the plant used	Reference
Antiseptic, antifever, antidyspeptic, carminative, tranquilizer and stomachic	Leaf	[372]
Antimicrobial activity against Helicobacter pylori, bacterium responsible for peptic diseases	Not specify	[373]
Anti-influenza and antispasmodic	Leaf	[371]

Table 32-4 Toxicity assessment of *Cymbopogon citratus* (DC.) Stapf

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	The oil extracted using Microwave-assisted hydrodistillation and hydrodistillation gives LC50 value of 0.35 µg/ml and 0.29 µg/ml, respectively.	[370]
MTT assay: The anti-proliferative activity of human lung non–small cell adenocarcinoma (A549) cell line and colon adenocarcinoma (HCT 116) cell line.	Not specify	The essential oil showed cytotoxic to HCT 116 cell with an IC50 of 10.35 µg/ml and to A549 cell with an IC50 of 17.74 µg/ml.	[374]
Cytotoxicity Assay permanent fibroblast cell line derived from human lung (MRC-5) (ATCC no. CCL-171)	Leaf	absence of cytotoxicity at doses up to 1 mM support the reputed beneficial properties of the tea and	[375]

		soft drinks prepared from lemongrass????	
Hemolytic Activity Human erythrocytes	Not specify	Essential oil low toxicity on the cell membrane of erythrocytes at concentrations lower than 500µg/ml.	[376]
Toxicity test: Each serial dose (1.56, 3.12, 6.25, 12.5, 25, and 50 µg/insect) solution was applied on the bodies of 50 newly-emerged (24-hour-old) Sitophilus granarius adults using a Hamilton microsyringe.	Leaf	The LD50 of the essential oil was 4.03 µg/insect (3.29–4.94 µg/insect).	[370]

A: Whole plant B: Leaf C: Stem

Figure 41 of *Cymbopogon citratus* (DC.) Stapf [377]

33. *Datura metel* L.

Scientific name: *Datura metel* L.

Synonyms: *Brugmansia chlorantha* [Hook.] Melliss

Datura aegyptiaca Vest.

Datura aegyptiaca Vis.

Datura alba Nees

Datura alba var. *africana* Mattei

Datura bojeri Delile

Datura carthaginensis Anon.

Datura carthaginensis Hort.

Datura chlorantha Hook.

Datura cornucopia Pitcher & Manda

Datura dubia Bianca

Datura dubia Bianca ex Tod.

Datura dubia Rich.

Datura dubia Rich. Ex Pers.

Datura fastuosa L.

Datura fastuosa subsp. *Alba* [Nees] C.B.Clarke

Datura fastuosa var. *alba* Bernh.

Datura fastuosa var. *flaviflora* O.E.Schulz

Datura fastuosa var. *flaviflora* O.E.Schulz ex O.C.Schmidt

Datura fastuosa var. *glabra* Bernh.

Datura fastuosa var. *parviflora* Nees

Datura fastuosa var. *rubra* Bernh.

Datura fastuosa var. *tuberculata* Bernh.

Datura fruticosa Hornem.

Datura hummatu Bernh.

Datura hummatu var. *fastuosa* [L.] Bernh.

Datura hummatu var. *muricata* [Link] Bernh.

Datura hummatu var. *rubra* Bernh.

Datura metel f. pleniflora O.Deg.

Datura metel var. *dentata* Schltdl. & Cham.

Datura metel var. *fastuosa* [L.] Saff.

Datura metel var. *flaviflora* [O.E.Schulz] Moldenke

Datura metel var. *muricata* [Link] Danert

Datura muricata Link

Datura nanakii Pandeya & A.B.Bhatt

Datura nigra Hassk.

Datura nilhummatu Dunal

Datura timoriensis Zipp.

Datura timoriensis Zipp. Ex Span.

Datura trapezia Nees

Datura waymanii [Paxton] Steud.

Stramonium datura Noronha

Stramonium fastuosum [L.] Moench

Stramonium globosum Bubani

Stramonium infernale Noronha

Stramonium metel [L.] Moench

Common name: Thorn Apple

Local name: Lam-phong

Family: Solanaceae

Distribution: Native to the Americas and throughout the tropics and subtropics.

Parts Used: Flower, Fruit

Description of the Plant: Herbs annual, 0.5-1.5 m tall, glabrescent. Stems often dark violet. Petiole 2-6 cm; leaf blade ovate or broadly ovate, 5-20 × 4-l5 cm, membranous, glabrescent [378].

Table 33-1 Traditional uses of *Datura metel* L.

Traditional uses	Parts Used	Reference
Diabetes mellitus	Root	[379]
Cure and prevent pain, asthma, rheumatism, begma, and convulsions	Flower	[380]

Skin rashes, Ulcers, Bronchitis, Jaundice and Diabetes	Seed	[381]

Table 33-2 Chemical constituents of *Datura metel* L.

Chemical constituents	Parts Used	Reference
Alkaloids, flavonoids and withanolides	leaf, Seed	[382]
Sesquiterpenoids	Leaf	[383]
Alkaloidal compounds	Whole plant	[381]
Beta-Sitosterol	Fruit	[384]

Table 33-3 Biological and pharmacological activities of *Datura metel* L.

Activities	Parts Used	Reference
Anti-Psoriasis	Flower	[380, 385]
Insecticidal, herbicidal, anti-fungal, anti-bacterial, anti-cancer, anti-inflammatory and anti-rheumatoid activity	Not specify	[381]
Anti-Oxidation	Flower	[380]
Antioxidant and Anticancer Activities	Seed	[386]
Anti-inflammatory	Leaf	[383]
Antidiabetic, antidyslipidemic	Root	[379]

Table 33-4 Toxicity assessment of *Datura metel* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Whole plant	The 90% methanol fraction showed LC50> 1000 µg/ml.	[387]
MTT assay: Three human cancer cell lines [HepG-2, Hela, and SGC-7901].	Flowers, leaves, seeds, roots, stems	Essential oil .The roots and stems showed IC50 levels of 613.88 and 341.12 mg/l for HepG-2 cell. The leaves and roots showed IC50 levels of 267.76 and 348.35 mg/l for HeLa cell. All different parts showed cytotoxicity against SGC-7901 cell which the highest activity was observed in the stems with IC50 153.3 mg/l, followed by the roots [188.69 mg/l].	[382]
MTT method:	Leaf	Compounds 1-3 exhibited moderate cytotoxicity against Hepg2. For MCF-7 and MDA-MB-231 cell lines, compound 1 showed stronger cytotoxic effects than the other two compounds,	[383]

		also exhibiting moderate cytotoxicity.	
Acute toxicity: on grasshoppers and red ants with different concentrations (5000, 10000 and 15000 µg/ml) for 10 minutes.	Leaves	Chloroform extract showed the EC50 value was 12000 µg/ml for grasshoppers and 11600 µg/ml for red ants.	[388]

Figure 42 of *Datura metel* L. [389, 390]

34. *Diospyros mollis* Griff.

Scientific name: *Diospyros mollis* Griff.

Synonyms: None

Common name: Ebony Tree

Local name: Phi-phao

Family: Ebenaceae

Distribution: A native of Burma and Thailand

Parts Used: Stem, Fruit

Description of the Plant: It is a shrub growing bears the fruits of 2-2.5 cm in diameter in summer [391]. The fruit has a small volume of flesh, becomes black when ripened on the tree or within a few days after dropping, Many seeds in the fruit [392].

Table 34-1 Traditional uses of *Diospyros mollis* Griff.

Traditional uses	Parts Used	Reference
Anthelmintic and black dye	Not specify	[393]
Anthelminthic or against tapeworms in the village	Not specify	[392]
Purging intestinal parasites, vomiting, nausea, emaciation, and wasting due to chronic illnesses	Not specify	[394]

Table 34-2 Chemical constituents of *Diospyros mollis* Griff.

Chemical constituents	Parts Used	Reference

Elliptinone (VI), Mamegakinone (VII), 4,5,8-trimethoxy-2-naphthaldehyde (XIII) Triterpenoids, lupeol, lupenone, betulin, taraxerol	Fruit, Bark, Root	[393]
Diglucoside of diospyrol,	Fruit	[395]
Naphthoquinone dimer, naphthalene derivative	Trunk	
Diospyrol (tetrahydroxy dimethyl binaphthalene)	Fruit	[396]

Table 34-3 Biological and pharmacological activities of *Diospyros mollis* Griff.

Activities	Parts Used	Reference
Hyaluronidase inhibitory activity	Not specify	[394]
Anthelmintic	Fruit	[396]

Table 34-4 Toxicity assessment of *Diospyros mollis* Griff.

Toxicity assessment	Parts Used	Results	References
Acute toxicity Test, Mice, rats and rabbits	Fruit	Not a single animal died excessive amount.	[396]
Subchronic Toxicity Tests, young albino, redeye rabbits		In subchronic toxicity, there was apparently no mortality in the lower doses of various kinds of ma-klua preparations.	

		The mortality, however, was equally increased in high and average doses. The group of fresh berry juice mixed with coconut milk the mortality is otherwise 100 % .	
MTT assay: Normal mouse fibroblast L929 and human breast cancer MCF-7 cell line.	Heartwood	The ethanolic extract showed cytotoxic effect against MCF-7 cell and L929 cell with IC50 values of 11.75 and 11.52 µg/ml.	[397]

A: Fruit B: Leaf

Figure 43 of *Diospyros mollis* Griff. [398]

35. *Dipterocarpus alatus* Roxb.ex G.Don

Scientific name: *Dipterocarpus alatus* Roxb.ex G.Don

Synonyms: *Dipterocarpus alatus* Roxb.

Common name: Hairy-leaf apitong

Local name: Yang-na

Family: Dipterocarpaceae

Distribution: Southeast and Asia

Parts Used: Oil

Description of the Plant: Medium to fairly large trees, up to 40 m (sometimes taller), 3 shorter ones up to 12 mm x 14 mm. fruit with wings [399].

Table 35-1 Traditional uses of *Dipterocarpus alatus* Roxb.ex G.Don

Traditional uses	Parts Used	Reference
Treatment of ulcerated wounds	Oil	[400]

Table 35-2 Chemical constituents of *Dipterocarpus alatus* Roxb.ex G.Don

Chemical constituents	Parts Used	Reference
Sesquiterpenes and triterpenes such as gurjunene, s-guaizulene and dipterocarpol	Oil	[401]

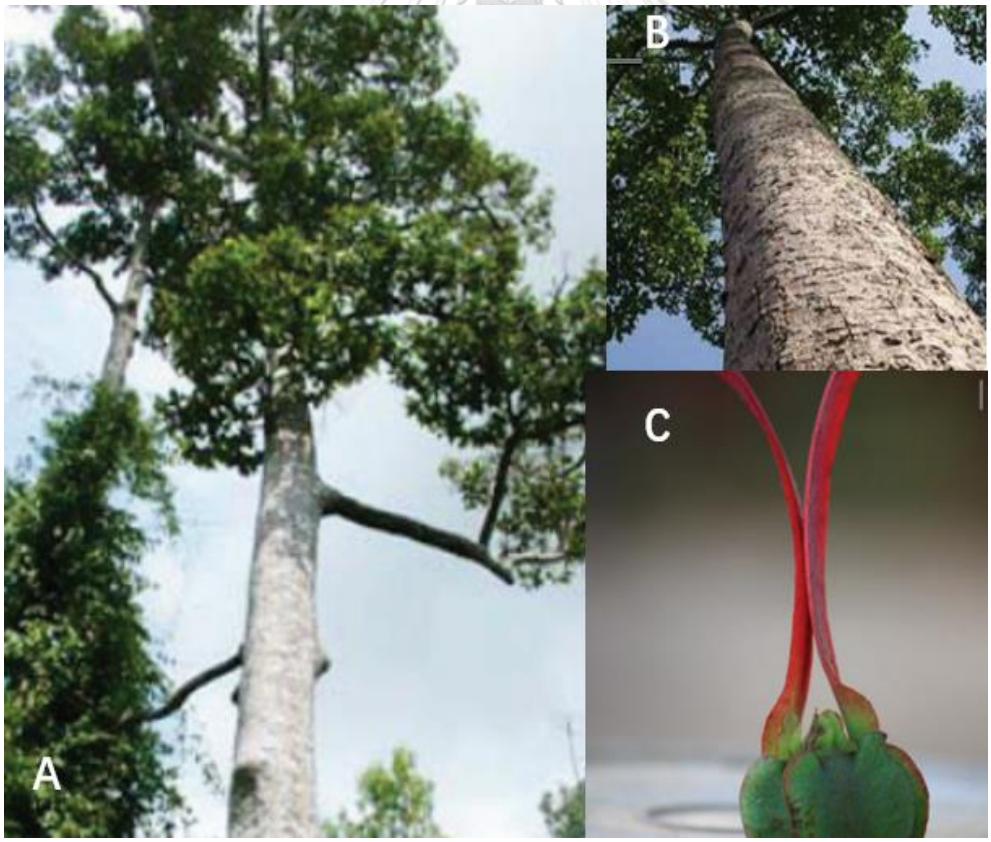
Table 35-3 Biological and pharmacological activities of *Dipterocarpus alatus* Roxb.ex G.Don

Activities	Parts Used	Reference
Antioxidant and cytotoxic activities	Leaf, Bark, Twig, Oleo-resin	[400]

Table 35-4 Toxicity assessment of *Dipterocarpus alatus* Roxb.ex G.Don

Toxicity assessment	Parts Used	Results	References
Neutral red (NR) assay: Normal African green monkey kidney (Vero), human colon cancer (HCT116), melanoma (SK-MEL-2), lung adenocarcinoma (SK-LU-1), cervix adenocarcinoma (SiHa) cell lines and human leukemic U937 cell line.	Leaf, twigs, bark and oleo-resin	The methanolic extract of all samples showed high cytotoxic activity against the U937 cell line with IC50 values of 91.3±6.2 (leaf), 106.1±7.8 (bark), 128.9±2.5 (twig), and 63.3±2.1 µg/ml (oleo-resin).	[402]
Neutral red (NR) assay: Human hepatocellular	Oleo-resin	The oleo-resin showed cytotoxic effect against Vero,	[403]

carcinoma (HepG2), cervical adenocarcinoma (HeLa), normal African green monkey kidney (Vero) cells lines and human acute T cell leukemia (Jurkat).		HepG2, HeLa and Jurkat cells with LC50 values of 88.7±4.2, 80.5 ± 1.3, 44. 5± 1.6 and 23.0 ± 2.1 µg/ml, respectively.	



A: Whole plant B: Stem C: Fruit

Figure 44 of *Dipterocarpus alatus* Roxb.ex G.Don[404]

36. *Euphorbia tirucalli* L.

Scientific name: *Euphorbia tirucalli* L.

Synonyms: *Arthrothamnus tirucalli* (L.) Klotzsch & Garcke

Euphorbia geayi Costantin & Gallaud

Euphorbia laro Drake

Euphorbia media N.E.Br.

Euphorbia media var. *bagshawei* N.E.Br.

Euphorbia media var. *bashawei* N.E.Br.

Euphorbia rhipsaloides Lem.

Euphorbia rhipsaloides Willd.

Euphorbia scoparia N.E.Br.

Euphorbia suareziana Croizat

Euphorbia tirucalli var. *rhipsaloides* (Willd.) A.Chev.

Euphorbia viminalis Mill.

Tirucalia indica Raf.

Tirucalia tirucalli (L.) P.V.Heath

Common name: African milkbush

Local name: Pha-ya-rai-bai

Family: Euphorbiaceae

Distribution: Tropical, subtropical Asia, America, the West Indies islands in Pacific Ocean

Parts Used: Stem, Gum/latex

Description of the Plant: It is a flowering shrub or tiny tree which can grow up to (4–12) m tall and about (15–20) cm in stem width with straight twigs. It is smooth, cylindrical, terete, polished, whorled branchlets not much thicker than a quill which bear in the rainy season [405].

Table 36-1 Traditional uses of *Euphorbia tirucalli* L.

Traditional uses	Parts Used	Reference
Against cancer	Not specify	[406, 407]
To treat asthma, cough, earache, rheumatism, verrucae, cancer, chancre, epithelioma, sarcoma, skin tumors, and against syphilis.	Latex	[408]

Table 36-2 Chemical constituents of *Euphorbia tirucalli* L.

Chemical constituents	Parts Used	Reference
Diterpenes, triterpenes, steroids, flavonoids and ellagitannins	Not specify	[407]
β-sitosterol, euphorbol hexacosonate, cycloeuphordenol, cyclotirucanenol, tirucalicine, tri-methyl ellagic acid, gallic acids, terpenic alcohol, isoeuphorol, taraxasterol, tirucallol, euphorone, euphorcinol, euphorbins, taraxerone,	Not specify	[405]

euphorginol, taraxerol, campesterol, stigmasterol, palmitic acid, linoleic acid, β-amyrin		

Table 36-3 Biological and pharmacological activities of *Euphorbia tirucalli* L.

Activities	Parts Used	Reference
Antimicrobial	Aerial parts	[409, 410]
Anticancer and Cytotoxic	Not specify	[406, 411]
Antioxidant	The pencil shape branches[410]	[410]
Anti-enzymatic, antimicrobial and cytotoxic		
Antiproliferative	Stem	[407]
Antibacterial	Not specify	[412]

Table 36-4 Toxicity assessment of *Euphorbia tirucalli* L.

Toxicity evaluation	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaves	LC50 values of methanol extract was > 1000 µg/ml.	[387]
Cell viability assay: Human pancreatic cancer primary cancer cell line (MiaPaCa2).	Whole plant	Both aqueous and methanol extracts showed similar activity at 50 µg/ml with a cell viability of about 50%.	[413]

Cell viability assays: human pancreatic cancer cell line Mia-PaCa2	whole plant	These results showed that EFW selectively inhibited the growth of leukemic cancer cells; solid human cancer cells are not sensitive to EFW and EFW has low toxicity in normal cells	[411]
MTT method: Colorectal adenocarcinoma cells Caco-2 cells	plant latex	The effect was linear and almost 22 0.5 mg/ml extract has inhibited 50% of cells relative to the control	[410]
Acute toxicity test: Freshwater fish, Heteropneustes fossilis.	Stem and branches	The LC50 values for aqueous extract latex at various exposure periods are 3.450 ml/l (24 h), 2.516 ml/l (48 h), 1.623 ml/l (72 h) and 1.315 ml/l (96 h).	[414]

Figure 45 of *Euphorbia tirucalli* L.

37. *Garcinia hanburyi* Hook F.

Scientific name: *Garcinia hanburyi* Hook F

Synonyms: *Garcinia morella var. pedicellata* T.Hanb.

Common name: Siam gamboge. Hanbury's garcinia.

Local name: Rong-thong

Family: Clusiaceae

Distribution: Forests of Cambodia, Southern Vietnam, and Thailand.

Parts Used: Gum

Description of the Plant: Deciduous tree, 7-15 m tall [415].

Table 37-1 Traditional uses of *Garcinia hanburyi* Hook F

Traditional uses	Parts Used	Reference
A potent purgative and against Infected wounds	Gum-resin	[416]

Table 37-2 Chemical constituents of *Garcinia hanburyi* Hook F

Chemical constituents	Parts Used	Reference
Fatty acid, tocopherol, sterol compositions	Seed	[417]

Table 37-3 Biological and pharmacological activities of *Garcinia hanburyi* Hook F

Activities	Parts Used	Reference
Anti-inflammatory, analgesic and antipyretic	Pericarp	[418]
Anti-HIV-1 and Anti-Inflammatory	Leaf, Twig, and Resin	[419]
Antioxidant activity	Seed	[417]
Antibacterial and antitumor activities	Resin	[420]

Table 37-4 Toxicity assessment of *Garcinia hanburyi* Hook F

Toxicity assessment	Parts Used	Results	References
Sulforhodamine B (SRB) assay: Two human CCA cell lines (KKU-100 and KKU-M156 cells).	Gamboge resin	Four caged xanthones (isomorellin, isomorellinol, forbesione and gambogic acid) extracted form this plant showed cytotoxic effect against KKU-100 and KKU-M156 cells with IC50 values of 0.11-2.64 and 0.02-0.43 µmol/l.	[421]

MTT assay: Two hepatocellular carcinoma cells; p53 deletion (Hep3B) and p53 mutation (Huh7).	Gamboge resin	The gambogic acid showed IC50 values of 1.8 μM for Hep3B and 2.2 μM for Huh7	[422]

A: Flower B: Leaf C: Bud

Figure 46 of *Garcinia hanburyi* Hook F[423]

38. *Garcinia mangostana* L.

Scientific name: *Garcinia mangostana* L.

Synonyms: *Mangostana garcinia* Gaertn.

Common name: Mangosteen

Local name: Mang-khud or manghud

Family: Clusiaceae

Distribution: Asia and Pacific

Parts Used: Peel, Seed

Description of the Plant: The mangosteen tree grows from 6 to 25m tall. [424]. Mangosteen is dark purple to red-purple, and it is luscious and delicious, with a sweet, slightly acidic taste and a pleasant aroma [425].

Table 38-1 Traditional uses of *Garcinia mangostana* L.

Traditional uses	Parts Used	Reference
Abdominal pain, diarrhea, cystitis, eczema, dysentery, wound suppuration and chronic ulcers	Pericarp	[426]
Fever, diarrhoea, dysentery, menstrual cramps, urinary tract infections and many other conditions	Not specify	[427]
Chronic diarrhoea, infected wounds, skin infections and dysentery	Not specify	[428]

Obesity, catarrh, cystitis, diarrhea, dysentery, eczema, fever, skin infections, wounds	Not specify	[425]
Skin infections, wounds and diarrhea	Fruit hulls	[429]

Table 38-2 Chemical constituents of *Garcinia mangostana* L.

Chemical constituents	Parts Used	Reference
Xanthones	Pericarp	[425, 429-438]
A-Mangostin, an Xanthone Derivative	Pericarp	[426, 439-441]
Γ-mangostin	Pericarp	[442]
Isogarcinol	Pericarp	[443]
B-mangostin	Pericarp	[425]
Epicatechin	Percarp	[444]
Pectin	Pericarp	[445]

Table 38-3 Biological and pharmacological activities of of *Garcinia mangostana* L.

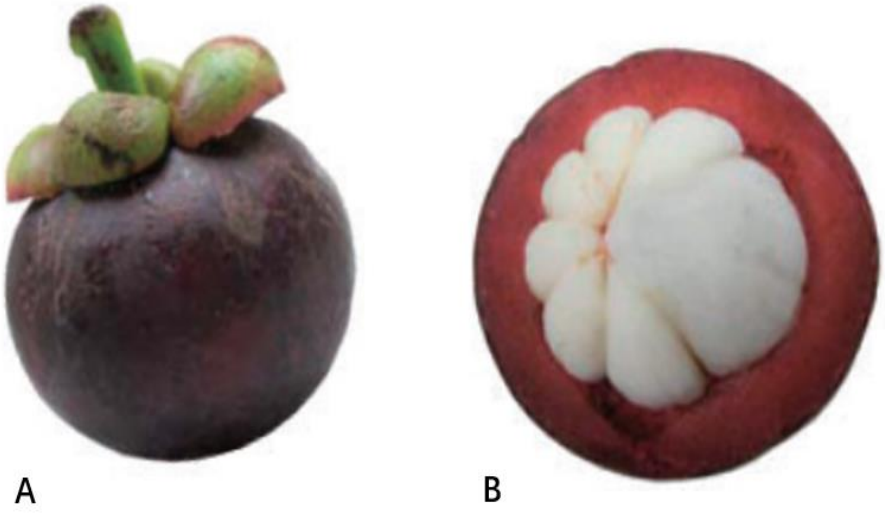
Activities	Parts Used	Reference
Anti-cancer	pericarp	[430, 432, 446]
Antioxidant	pericarp	[430, 434-436, 438, 439, 445, 447-453]
Anti-inflammatory	pericarp	[430, 454]
Antimicrobial	pericarp	[430, 455]
Antiplasmodial; antileishmanial; antitrypanosomal	pericarp	[426]
Antimalarial	pericarp	[456]
Antitumour	pericarp	[439, 440, 442]
Antimicrobial and antitumoral	fresh fruits (seedless without core), leaf and resin	[457]
Antibacterial	Not specify, pericarp, bark	[431], [428, 444, 458], [437]

Antimicrobial, cytotoxic, antitumour, anti-inflammatory, antimalarial, antiviral, antimycobacterial, antioxidant, antiglucosidase and antileptospiral antihyperglycaemic, anti-inflammatory, antioxidant and antitumour	pericarp	[427]
Anti-inflammatory	pericarp	[441, 443]
Antibacterial against methicillin-resistant Staphylococcus aureus	pericarp	[459]
Antifungal	pericarp	[433, 458]
Antibacterial against cariogenic organisms	pericarp	[460]
Anti-obesity, anti-adipogenic	pericarp	[425]
Antidepressant-like and pro-cognitive	pericarp	[461]
Antileptospiral	pericarp	[462]
Antimalarial	pericarp	[449, 463]
Neuroprotective	pericarp	[450]
Anti-angiogenesis	pericarp	[464]

Table 38-4 Toxicity assessment of of *Garcinia mangostana* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Hull	LC50 values of methanolic extract and ethanolic extract were 153.88±3.37 and 161.75±5.09 µg/ml, respectively.	[465]
MTT assay: The anti-proliferative activity of human breast cancer MCF-7 cell.	Hull	IC50 values of methanolic extract and ethanolic extract were 437.54±7.94 and 466.41±10.05 µg/ml, respectively.	[465]
XTT assay: The anti-proliferative activity of human colorectal carcinoma cell line (HCT 116) and normal colonic fibroblast (CCD-18Co).	Fruit	The toluene extract showed IC50 values for HCT 116 cells of 6.5 ± 1.0 µg/ml (xanthones extract), 5.1 ± 0.2 µg/ml (a-mangostin), and 7.2 ± 0.4 µg/ml (g-mangostin) and IC50 values for CCD18Co normal cells of 11.1 ± 0.4 µg/ml (a-mangostin), and 13.0 ± 0.6 µg/ml (xanthones extract).	[430]

Acute toxicity: Oral administration of Sprague Dawley rats at a dose of 2000 mg/kg for 14 day. Sub-chronic toxicity: Oral administration of Sprague Dawley rats at a dose of 10, 50, and 100 mg/kg for 3 months.	Pericarp	Acute toxicity: The results showed no abnormalities. Sub-chronic toxicity: A safe dosage of hydro-extract would be < 100 mg/kg BW/day.	[466]



A: Fruit B: Inside of the fruit

Figure 47 of *Garcinia mangostana* L. [436]

39. *Gonostegia pentandra* (Roxb.) Miq.

Scientific name: *Gonostegia pentandra* (Roxb.) Miq.

Synonyms: *Gonostegia pentandra* infrasp. *akoensis* (Yamam.) Yamam. & Masam.

Gonostegia pentandra infrasp. *hypericifolia* (Blume) Masam.

Memorialis pentandra (Roxb.) Wedd.

Memorialis pentandra infrasp. *akoensis* Yamam.

Memorialis pentandra infrasp. *hypericifolia* (Blume) Wedd.

Pouzolzia hypericifolia Blume

Pouzolzia pentandra (Roxb.) Bennet

Pouzolzia pentandra infrasp. *hypericifolia* (Blume) Masam.

Urtica pentandra Roxb.

Common name: Narrow-Leaf Pouzolz's Bush

Local name: Khob-cha-nang-dang

Family: Urticaceae

Distribution: Afghanistan, Bangladesh, India, Indonesia, Myanmar, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand and Vietnam.

Parts Used: Aerial part

Description of the Plant: Perennial herbs up to 1 m tall, single fruit. The lower part of the stem is cylindrical and the upper part is square. Wings 2.5 × 1.5 mm, villous, 3.5

mm long, with moles, achenes, black, 1.0-1.2 mm. Flowers and fruits from June to September [467].

Table 39-1 Traditional uses of *Gonostegia pentandra* (Roxb.) Miq.

Traditional uses	Parts Used	Reference
Useful in the treatment of skin rashes	Not specify	[467]
Treating eczema	Not specify	[468]
Eliminates pus, sore; stops bleeding, dysentery, skull itch	Whole plant	[469]
Dermatological, and urological diseases	Stem and leaf	[470]

Table 39-2 Chemical constituents of *Gonostegia pentandra* (Roxb.) Miq.

Chemical constituents	Parts Used	Reference
Phenolics	Aerial part	[471]

Table 39-3 Biological and pharmacological activities of *Gonostegia pentandra* (Roxb.) Miq.

Activities	Parts Used	Reference
Anti-inflammatory	Whole plant	[469]
Antibacterial	Stem and leaf	[470]

Anti H. pylori	Leaf	[472]

Table 39-4 Toxicity assessment of *Gonostegia pentandra* (Roxb.) Miq.

Toxicity assessment	Parts Used	Results	References
SRB assay: The anti-proliferative activity on human hepatoma (Hep G2) cell line.	Leaves	The methanolic extract showed IC50 value of 35.51 µg/ml for Hep G2 cell line.	[473]
SRB assay: The anti-proliferative activity on human cervical adenocarcinoma (HeLa) and mouth epidermal carcinoma (KB) cells.	Leaves	The methanolic extract showed GI50 value of 37.28 µg/ml for HeLa and 317.55 µg/ml for KB cells. [active (GI50<20 mg/ml); moderately active (20≤GI50≤100 mg/ml); inactive (GI50>100 mg/ml)]	
MTT assay: The anti-proliferative activity on human breast cancer cell lines (SKBR3,	Stem and leaves	The ED50 values of ethanolic extract for all human breast cancer cells	[474]

MCF7, T47D and MDA-MB435) and human lung cancer cell lines (A549 and SK-LU1)		and human lung cancer cells were >500 mg/ml.	

Figure 48 of *Gonostegia pentandra* (Roxb.) Miq. [467]

40. *Heliotropium indicum* L.

Scientific name: *Heliotropium indicum* L.

Synonyms: *Eliopia riparia* Raf.

Eliopia serrata Raf.

Heliophytum foetidum DC.

Heliophytum indicum (L.) DC.

Heliophytum velutinum (Lehm.) DC.

Heliotropium africanum Schum. & Thonn.

Heliotropium anisophyllum P.Beauv.

Heliotropium cordifolium Moench

Heliotropium foetidum Salisb.

Heliotropium horminifolium Mill.

Heliotropium lanceolatum Noronha

Heliotropium parviflorum Blanco

Tiaridium anisophyllum (P.Beauv.) G.Don

Tiaridium indicum (L.) Lehm.

Tiaridium indicum var. *mexicanum* M.Martens & Galeotti

Tiaridium velutinum Lehm.

Family: Boraginaceae

Common name: Indian heliotrop

Local name: Ya-wong-chang

Distribution: Tropical and subtropical regions of the world and many temperate areas.

Parts Used: Stem, Leaf

Description of the Plant: H. H. indicum is an erect, thick, pungent, herbaceous plant with branches 20 to 60 cm tall. The leaves are opposite or opposite. Alternate or shuffle and go straight ahead. Looks like a sheet from oval to oval. Hairy and pointed, 5-10 cm long, wavy margins. Both nerves are wavy or linear. and clearly visible under the leaves Petioles 1-7 cm long, while flowers grow within the leaf stalks. At maturity, there will be a nut at the base of the inflorescence. in general The flowers are white or purple-white, usually in the axils of the leaves. and almost 5 mm in diameter. The sepals are pubescent outside. dark green It is linear to lanceolate. Irregular or uneven, and about 5–3 mm long. Fruits are dry and lobed, 2–4 with or without a combined nut and 3–6 mm long. This species grows in full sun and Requires a height of about 800 meters.[475]

Table 40-1 Traditional uses of *Heliotropium indicum* L.

Traditional uses	Parts Used	Reference
Dandruff, skin ailments, kidney dysfunction, and fever, conjunctivitis and locally applied in boils, gingivitis, pimples, sores, ulcers and wounds	Leaf	[476]

Cure gallstones. Boil and drink as a medicine for stomach disease. The whole plant is boiled and drunk to cure gallstones. Take hemorrhoid medication boil, drink or take a bath, relieve pain, cure cancer, take a bath to cure itching	Root	

Table 40-2 Chemical constituents of *Heliotropium indicum* L.

Chemical constituents	Parts Used	Reference
Pyrrolizidine alkaloids such as indicine, indicine N oxide, acetyl indicine, indicinine, helecerine, heliotrine, supinine, lindelofidine	Not specify	[476]

Table 40-3 Biological and pharmacological activities of *Heliotropium indicum* L.

Activities	Parts Used	Reference
Anti-cancer, Hepatotoxic	Not specify	[476]
Anti-microbial, anti-tumor, anti-tuberculosis, anti-plasmodial, anti-cataract, anti-fertility, wound healing, anti-inflammatory, antinociceptive, analgesic	Not specify	[477]

Table 40-4 Toxicity assessment of *Heliotropium indicum* L.

Toxicity assessment	Parts Used	Results	References

Sulphorhodamine B (SRB) assay: Two types of lung carcinoma cell lines; human lung adenocarcinoma epithelial cell line (A549) and human lung squamous carcinoma cell line (NCI-H226).	Whole plant	The ethanolic extract showed IC50 of 51.90+2.35 μg/ml for NCI-H226 cell and aqueous extract showed IC50 >100 μg/ml for A549 and NCI-H226.	[478]
MTT assay: Human cancer cell line (HeLa).	Stem, Leaf	The methanolic extracts of stem and leaf showed IC50 values of 200μg/ml.	[422]

Leaf with flower Flower

Figure 49 of *Heliotropium indicum* L

41. *Hopea odorata* Roxb.

Scientific name: *Hopea odorata* Roxb.

Synonyms: *Doona odorata* (Roxb.) Burck

Hopea decandra Buch.-Ham.

Hopea decandra Buch.-Ham. ex Wight

Hopea odorata subsp. eglandulosa Pierre

Hopea odorata subsp. flavescens Pierre

Hopea vasta Wall.

Hopea vasta Wall. ex DC.

Hopea wightiana Miq.

Hopea wightiana Miq. ex Dyer

Neisandra indica Raf.

Common name: Iron wood

Local name: Ta-khian

Family: Dipterocarpaceae

Parts Used: Leaf, Bark, Wood

Description of the Plant: Up to 45 m tall, the canopy is dense, dark green, with large, slender, dangling branches. In evergreen bark, the bark is dark brown with scales. Mature leaves are dark green and almost smooth [479].

Table 41-1 Traditional uses of *Hopea odorata* Roxb.

Traditional uses	Parts Used	Reference
Treating sores and wounds	Dammar gum	[480]
Treating paralysis, haemorrhoids, diarrhea, gum inflammation, and urinary incontinence	Bark and leaf	
Neck pains	Stem bark	
Yaws, blood disorder, fever, and as expectorant	Wood	
Wound healing	Stem latex	

Table 41-2 Chemical constituents of *Hopea odorata* Roxb.

Chemical constituents	Parts Used	Reference
Betulonic acid, betulinic acid (the first acid, 3,30-dioxolup-20(29)-en-28-oic acid (the first found in the nature) and messagenic acid G.	Leaf	[481]
Various resveratrol derivatives, including Hopeaphenol, vaticanol B, hemsleyanol B, stemonoporal A, e-viniferin, and laevifono.	Not specify	[480]

Table 41-3 Biological and pharmacological activities of *Hopea odorata* Roxb.

Activities	Parts Used	Reference
Antibacterial activity	Leaf	[482]
Antioxidant, antidiarrheal, hypoglycemic and thrombolytic	Leaf	[480]

Table 41-4 Toxicity assessment of *Hopea odorata* Roxb.

Toxicity assessment	Parts Used	Results	References
Alamar Blue assay: Human HCC cell line (HepG2) and normal human fibroblasts (HFs).	Bark	The methanolic extract showed IC50 values of 12.67±5 µg/ml on HepG2 and 44±3 µg/ml on HFs.	[483]
MTT assay: Peritoneal Macrophages (RAW264.7).	Leaf and bark	The methanolic extract showed no cytotoxicity on RAW264.7 cell.	[483]

Flower with leaf

Figure 50 of *Hopea odorata* Roxb. [484]

42. *Indigofera tinctoria* L.

Scientific name: *Indigofera tinctoria* L.

Synonyms: *Anil tinctoria* (L.) Kuntze

Anil tinctoria var. *normalis* Kuntze

Anila tinctoria (L.) Kuntze

Anila tinctoria var. *normalis* Kuntze

Indigofera anil subsp. *orthocarpa* DC.

Indigofera bergae Vatke

Indigofera hover Forssk.

Indigofera suffruticosa A.E.Gonç.

Indigofera tinctoria Blanco

Indigofera tinctoria subsp. Tinctoria

Common name: Bengal Indigo

Local name: Crarm

Family: Fabaceae/leguminosae

Distribution: Tropical climate with altitude between 0-300 m above sea level

Parts Used: Root, Indigo (colour)

Description of the Plant: Herbs perennial with long, creeping hollow stems. The leaves are 5-12.5cm long, 3.2-7.5cm wide, heart-shaped, erect shrubs, up to 1.5m high, branching from the base. Leaves solitary. Corolla are pale pink and oval

timentos. Beans are about 3 cm long with a rounded tip, and the seeds are 2 mm long and square. Each cylindrical pod contains about 10 seeds. [485].

Table 42-1 Traditional uses of *Indigofera tinctoria* L.

Traditional uses	Parts Used	Reference
liver disorders like hepatomegaly	Not specify	[485]
Prevent hydrophobia, sores and ulcers	Leaf	
Prevent urinary disorders and hepatitis, antidote for scorpion bites	Root	

Table 42-2 Chemical constituents of *Indigofera tinctoria* L.

Chemical constituents	Parts Used	Reference
Bradyrhizobium	Root	[486]
Indigotin	Leaf	[485]
A glycoside composed of galactose, mannose and 2.5% of alkaloids, proteinoids and flavonoids, indigo, indigo, indirubin and galactomannan.	Whole plant	[487]

Table 42-3 Biological and pharmacological activities of *Indigofera tinctoria* L.

Activities	Parts Used	Reference
Antioxidant	Root, Leaf; Whole plant	[485]; [488]

Antidiabetic	Leaf	
Antibacterial, antioxidant and cytotoxic	Leaf	[487]

Table 42-4 Toxicity assessment of *Indigofera tinctoria* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA):	Leaf	The hydro-alcoholic extract showed IC50 of 3540 µg/ml.	[489]
MTT assay: Lung cancer cell line NCI-h69.	Leaf	The methanolic extract showed the lowest cell viability of 43.28% at 250 µg/ml.	[487]
MTT assay: Human colon cancer cell line HCT 116	Leaf	The methanolic extract showed cytotoxic effect against Human colon cancer cell line HCT 116 with IC50 value of 1 µg/ml.	[490]

A: Leaf B: Flower

Figure 51 of *Indigofera tinctoria* L. [485]

43. *Ipomoea aquatia* Forsk.

Scientific name: *Ipomoea aquatia* Forsk.

Synonyms: *Batatas incurva* Benth.

Convolvulus adansonii Desr.

Convolvulus clappertonii Spreng.

Convolvulus incurvus Schum. & Thonn.

Convolvulus repens Vahl.

Convolvulus rostratus Zipp.

Convolvulus rostratus Zipp. ex Span.

Ipomoea clappertonii R.Br.

Ipomoea incurva G.Don

Ipomoea natans Dinter & Suess.

Ipomoea repens Roth.

Ipomoea reptans Poir.

Ipomoea sagittifolia Hochr.

Ipomoea sagittifolia Hook. & Arn.

Ipomoea subdentata Miq.

Family: Convolvulaceae

Common name: Swamp morning glory, Water spinach

Local name: Phak-boong-thai

Distribution: Tropical asia, fresh water aquatic habitats

Parts Used: Leaf, Stem

Description of the Plant: Herbs perennial, with long, creeping hollow stems. The leaves are 5 to 12.5 cm long and 3.2 to 7.5 cm wide, with a heart-shaped, or round or pointed tip, and the petiole is 3.8 to 12.5 cm long. Both ventral surfaces are usually flat, rarely slightly concave, dorsally arched, ventral surface broadly oval or sub round oval, side profile concave oval[491].

Table 43-1 Traditional uses of *Ipomoea aquatia* Forsk.

Traditional uses	Parts Used	Reference
Traditionally, I. aquatica used as carminative agent and lessens inflammation, and is useful in fever, jaundice, biliousness, bronchitis, liver complaints,	Not specify	[491]
Carminative agent, fever, jaundice, biliousness, bronchitis, liver complaints	Not specify	[491]
Inflammation, fever, jaundice, biliousness, and bronchitis	Not specify	[492]
Carminative, lessens inflammation; useful in fever, jaundice, biliousness, bronchitis, liver complaints	Not specify	[493]

Table 43-2 Chemical constituents of *Ipomoea aquatia* Forsk.

Chemical constituents	Parts Used	Reference

3,5-di-Ocaffeoylquinic acid, 4,5-di-O-caffeoylquinic acid, and quercetin 3-O-β-D-glucoside	Leaf, Stem	[494]
Tannins, saponins, flavonoids, alkaloids, protein, phenols, glycosides and carbohydrate	Leaf, Stem	[492]

Table 43-3 Biological and pharmacological activities of *Ipomoea aquatia* Forsk.

Activities	Parts Used	Reference
Antioxidant	Flower, Leaf, Seed, Leaf, Stem	[491, 494-498]
Antioxidative activities, membrane stabilization	Leaf, Stem	[498]
A-glucosidase inhibitory, anti-diabetic activity	Flower, Leaf, whole plant, Seed	[491, 494]
Anti-inflammatory	Leaf, Stem	[498]
Antihyperlipidemia, antihyperglycemic, antihypertensive effect and antioxidant	Not specify	[499]

Table 43-4 Toxicity assessment of *Ipomoea aquatia* Forsk.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf and stem	The methanolic extracts showed LC50 values of 160.87 and 111.42 µg/ml for leaf and stem. The reference standard (potassium dichromate) showed LC50 of 44.20 µg/ml.	[498]
MTT assay: Human breast cancer MCF–7 cell.	Whole plant	The ethanolic extract showed cytotoxic effect against MCF–7 cell with IC50 value of 220.9 µg/ml.	[500]

Whole plant [501]

Figure 52 of *Ipomoea aquatica* Forsk

44. *Lagenaria siceraria* (Molina) Standl.

Scientific name: *Lagenaria siceraria* (Molina) Standl.

Synonyms: *Cucumis bicirrha* Forst.

Cucumis bicirrha Forst. ex Guill.

Cucumis lagenaria (L.) Dumort.

Cucumis lagenarius (Moench) Dum.Cours.

Cucumis mairei H.Lév.

Cucurbita ciceraria Molina

Cucurbita idolatrica Willd.

Cucurbita idololatrica Willd.

Cucurbita lagenaria L.

Cucurbita lagenaria var. *oblonga* Blanco

Cucurbita lagenaria var. *villosa* Blanco

Cucurbita leucantha Duchesne

Cucurbita leucantha Duchesne ex Lam.

Cucurbita longa W.M.Fletcher

Cucurbita pyriformis M.Roem.

Cucurbita siceraria Molina

Cucurbita vittata Blume

Lagenaria abyssinica subsp. *somaliensis* (Chiov.) Cufod.

Lagenaria bicornuta Chakrav.

Lagenaria cochinchinensis M.Roem.

Lagenaria hispida Ser.

Lagenaria idolatrica (Willd.) Ser. ex Cogn.

Lagenaria idolatrica Ser.

Lagenaria lagenaria (L.) Cockerell

Lagenaria leucantha (Duchesne ex Lam.) Rusby

Lagenaria siceraria subsp. *laevisperma* Millán

Lagenaria siceraria var. *laevisperma* Millán

Lagenaria siceraria var. *siceraria*

Lagenaria verrucosa Hort.

Lagenaria virginalis Hort.

Lagenaria vittata Ser.

Lagenaria vulgaris Ser.

Lagenaria vulgaris subsp. afrikana Kobjakova

Lagenaria vulgaris subsp. asiatica Kobjakova

Lagenaria vulgaris subsp. asiatica Kobyakova

Lagenaria vulgaris var. *clavata* Ser.

Lagenaria vulgaris var. *gourda* Ser.

Pepo lagenarius Moench

Trochomeria rehmannii Cogn.

Lagenaria siceraria subsp. *asiatica* Heiser

Lagenaria siceraria subsp. *siceraria* (Molina) Standl.

Lagenaria siceraria var. *depressa* (Ser.) H.Hara

Lagenaria siceraria var. *hispida* (Thunb.) H.Hara

Lagenaria siceraria var. *microcarpa* (Naudin) H.Hara

Lagenaria siceraria f. depressa (Ser.) Hiroë

Lagenaria siceraria f. siceraria

Common name: Bottle Gourd; Calabash; Calabash Gourd; White-flower Gourd

Local name: Nam-tao

Family: Cucurbitaceae

Distribution: Pantropical, but probably introduced outside Africa and Asia

Parts Used: Leaf

Description of the Plant: Herbs. Ivy climbing and tracking. single. Stems herbaceous, angular, pubescent, 0.2-0.3 cm in diameter. Ivy 2-lobed, spiral above branch point. Leaves simple, alternate, petiolate, elongated. Pods branched, sepals, dark green, pointed, toothed, 4-15 × 5-15 cm; petioles terete, 3-5 cm long; herbs, pubescent, inflorescences axillary. Male flowers tubular calyx; petals white, 5 free, slightly pubescent. Fruit spherical, cylindrical, sometimes irregular. 5-15 cm in diameter, petioles smooth and green. [502].

Table 44-1 Traditional uses of *Lagenaria siceraria* (Molina) Standl.

Traditional uses	Parts Used	Reference
Cardioprotective, cardiotonic and diuretic, cures pain, ulcers, jaundice and fever, and pectoral cough, asthma and other bronchial disorders	Fruit	[503]
Tonic, diuretic, aphrodisiac, and antidote for scorpion strings poisons, cardioprotective, alternative purgative and showed cooling effects	Fruit	[504]
Jaundice, diabetes, ulcer, piles, colitis, insanity, hypertension, congestive cardiac failure, and skin diseases	Leaf, fruit, seed	

Table 44-2 Chemical constituents of *Lagenaria siceraria* (Molina) Standl.

Chemical constituents	Parts Used	Reference
Fecosterol, racemosol, stigmasterol,	Fruit	[505]
Phenolics, flavonoids, tannins and terpenoids	Fruit (epicarp, mesocarp and seed)	[506]

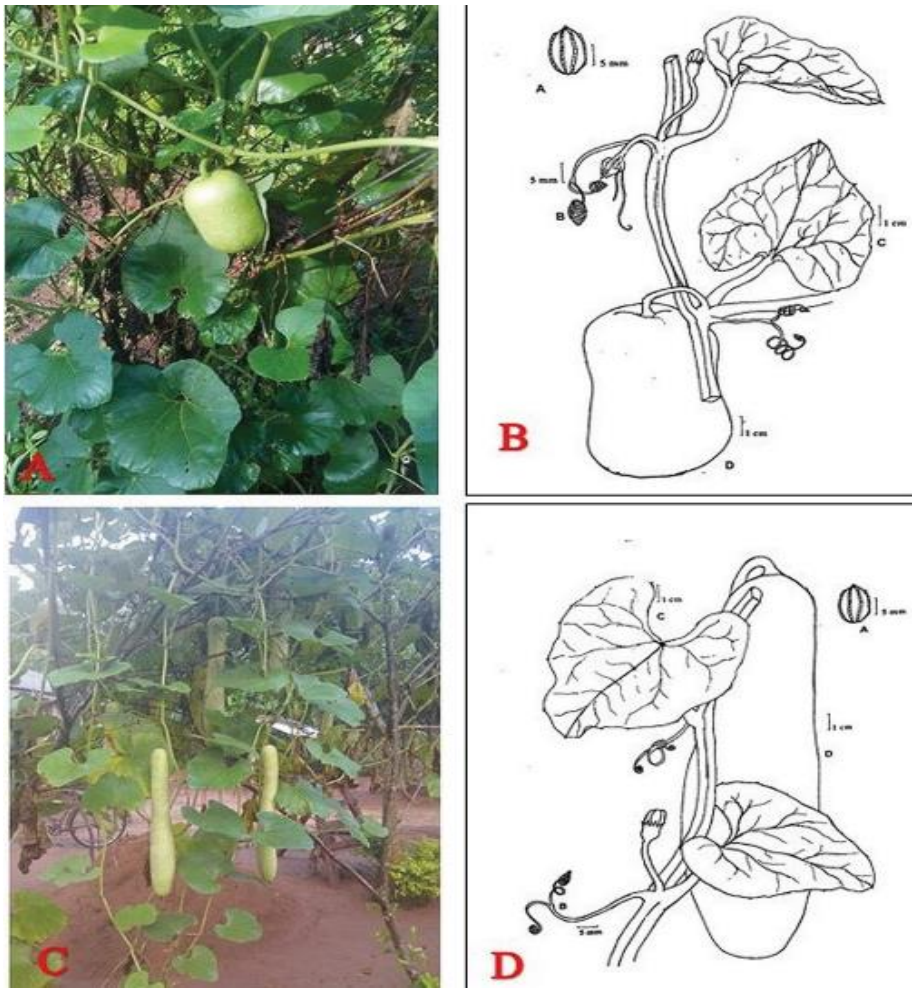
Table 44-3 Biological and pharmacological activities of *Lagenaria siceraria* (Molina) Standl.

Activities	Parts Used	Reference
Immune protective, antitumor, anti-HIV, and antiproliferative properties	Seed	[504]
Antioxidant	Fruit	[507]

Table 44-4 Toxicity assessment of *Lagenaria siceraria* (Molina) Standl.

Toxicity assessment	Parts Used	Results	References
Anticancer assay: human cancer cell lines (MCF-7 and HT-29)	Fruit	The acetone, ethanol, meth-anol and water extract showed cytotoxic effect against human cancer cell colon cancer line HT-29	[506]
Brine shrimp lethality assay (BSLA)	Whole plant	The methanolic extract showed IC50 value of 35.84 µg/ml.	[508]
MTT assay: Lung cancer cell line (A549).	Not specify	The hydro-alcoholic extract showed IC50 of 93.094 ± 6.5 µg/ml.	[500]

Acute toxicity: Oral administration of Wistar rats at a single dose of 2000 mg/kg.	Fruit	The methanolic extract showed LD50 value higher than 2000 mg/kg.	[509]



A. and C.: Fruit

B. and D.: Morphological feature

(A) Seed. (B) Tendrils. (C) Leaf. (D) Fruit. [502]

Figure 53 of *Lagenaria siceraria* (Molina) Standl.

45. *Mallotus nudiflora* (L.) Kulju &Welzen

Scientific name: *Mallotus nudiflora* (L.) Kulju&Welzen

Synonyms: *Trewia nudiflora* L.

Mallotus cardiophyllus Merr.

Rottlera hoperiana Blume

Rottlera hoperiana Blume ex Müll.Arg.

Rottlera indica Willd.

Rottlera operiana Blume

Rottlera operiana Blume ex Baill.

Trevia integerrima Stokes

Trevia macrophylla Roth

Trevia macrostachya Klotzsch

Trevia nudiflora L.

Trevia nudiflora var. *tomentosa* Susila & N.P.Balakr.

Trewia integerrima Stokes

Trewia macrophylla Roth

Trewia macrostachya Klotzsch

Trewia nudiflora var. *tomentosa* Susila & N.P.Balakr.

Common name: Hua-tao-shu

Local name: Ma-for

Family: Euphorbiaceae

Distribution: From India and Nepal throughout mainland Southeast Asia to southern China (Hainan, Yunnan) and West Malesia

Parts Used: Leaf

Description of the Plant: Generally medium to large perennial plants about 15 meters high, the trunk is dark gray and the crown is cracked and densely spread, 6.3-10 cm long, 3.2-5 cm wide, and the top is round, oval or oval. Wavy margins; petiole 1.3-2.5 cm long; petioles and branches produce sap. Sepals 1 cm long, fluffy, corolla white, fragrant, flowers 8 mm long, 24 pieces. Berries, oval about 2.5 cm long, yellow, juicy when ripe. The flat brown seeds are glossy [510].

Table 45-1 Traditional uses of *Mallotus nudiflora* (L.) Kulju & Welzen

Traditional uses	Parts Used	Reference
Relieve swelling and to treat flatulence, excessive bile and sputum.	Shoot and leaf	[511]
Wounds	Leaf	
Gout and rheumatism	Root	

Table 45-2 Chemical constituents of *Mallotus nudiflora* (L.) Kulju&Welzen

Chemical constituents	Parts Used	Reference
Cardenolides, sterols, triterpenoids, diterpenoids, alkaloids and nitrogen-containing compounds, lignans	Not specify	[511]

and neolignans, simple phenolics, flavonoids, ellagic acid derivatives, phenylpropanoid glucosides, α-tocopherol, and the cucurbitacin trewini		
Two new cardenolides, trewianin and trewioside, along with scopoletin and indole-3-carboxylic acid	Stem bark	
Novel Triacylglycerol Estolides	Seed	[512]

Table 45-3 Biological and pharmacological activities of *Mallotus nudiflora* (L.) Kulju & Welzen

Activities	Parts Used	Reference
Antibacterial activity	Fruit	[513]
Antibacterial activity	Seed	[514]

Table 45-4 Toxicity assessment of *Mallotus nudiflora* (L.) Kulju & Welzen

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf, twigs, fruits and seeds	The ethanolic extracts of leaves, twigs, fruits and seeds showed cytotoxic activity with LC50 values at 9.17 μg/ml, 10 μg/ml, 10.53 μg/ml and 18.81 μg/ml, respectively. Standard vincristine	[515]

		sulfate showed LC50 at 6.11 μg/ml.	

A: Whole plant, B: Tree, C: Male flower, D: Fruit, E: Seed , F: Processing of fruits for fatty oil extraction [514]

Figure 54 of *Mallotus nudiflora* (L.) Kulju & Welzen

46. *Mimusops elengi* Linn.

Scientific name: *Mimusops elengi* Linn.

Synonyms: *Diospyros longipes* Hiern

Imbricaria perroudii Montrouz.

Kaukenia elengi (L.) Kuntze

Kaukenia javensis (Burck) Kuntze

Kaukenia timorensis (Burck) Kuntze

Magnolia xerophila P.Parm.

Manilkara parvifolia (R.Br.) Dubard

Mimusops elengi f. longepedunculata (Bruck) H.J.Lam

Mimusops elengi var. *longepedunculata* Bruck

Mimusops elengi var. *parvifolia* (R.Br.) H.J.Lam

Mimusops erythroxylon Llanos

Mimusops erythroxylon Llanos ex Fern.-Vill.

Mimusops javensis Burck

Mimusops latericia Elmer

Mimusops lucida Poir.

Mimusops parvifolia R.Br.

Mimusops timorensis Burck

Common name: Spanish cherry

Local name: Phikul

Family: Sapotuceae

Distribution: Dry areas, often on laterite

Parts Used: Root, Flower, Bark, Leaf

Description of the Plant: Medium to large perennials. Generally, about 15 meters high, the trunk is dark gray. Dehiscence has a densely expanded crown, 6.3-10 cm long, 3.2-5 cm wide, with rounded, oval or elliptical apex. Wavy margins; petioles 1.3-2.5 cm long; petioles and branches produce sap. Sepals 1 cm long, fluffy, corolla white, fragrant, flowers 8 mm long, 24 pieces. Berries, about 2.5 cm long, oval, yellow, juicy when ripe. Seeds are oval, flat brown, and shiny. [516]

Table 46-1 Traditional uses of *Mimusops elengi* Linn.

Traditional uses	Parts Used	Reference
Used in various Ayurvedic and folk medications to treat various ailments.	Stem, bark, Leaf, Fruit	[517]
In the prehistoric days were an important source of diet.	Fruit	
Used for cooling, a cardio tonic, alexipharmic, stomachic, anthelmintic, tonic, astringent which cures biliousness, diseases of the gums and teeth.	Bark	[518]
Used to cures the disease of blood, cure biliousness, liver complaints, diseases of the nose, headache, their smoke is good in asthma.	Flower	

It is astringent to the bowel, good for the teeth, causes flatulence.	Fruit	
Used as a cure diseases in the head.	Seed	
It is aphrodisiac, diuretic, astringent to the bowel, good for gonorrhea and used as a gargle which cures relaxation of the gums.	Root	

Table 46-2 Chemical constituents of *Mimusops elengi* Linn.

Chemical constituents	Parts Used	Reference
Alkaloids, flavonoids, phenols, phytosterols, carbohydrates, terpenoids and proteins.	Flower	[218]
Triterpenes and alkaloids	Whole plant	[517]
Taraxerone, taraxerol, betulinic acid and spinasterol, sodium salt of betulinic acid and ursolic acid, Fatty acid esters of alpha-spinasterol	Stem bark	[518]
Pentacyclic triterpene, mimusopfarnanol		
Alpha cadinol, tau muurolol, hexadecanoic acid, diisobutyl phthalate, octadecadienoic acid. New gallic acid esters, characterized as phenyl propyl gallate		

Quercitol, ursolic acid, dihydro quercetin, quercetin, β - d glycosides of β sitosterol, alphaspinasterol	Fruit and seed	

Table 46-3 Biological and pharmacological activities of *Mimusops elengi* Linn.

Activities	Parts Used	Reference
Anti-diabetic	Flower	[218]
Antioxidant	Flower	[218, 219]
Antimicrobial, antifungal, antioxidant and free radical scavenging, antiinflammatory analgesic, antipyretic, antiurolithiatic, cytotoxic, diuretic, neuroprotective, anti-amnesic, cognitive enhancing, antihyperglycemic, antihyperlipidemic, hypotensive, antiulcer, anthelmintic, antitumor, wound healing, larvicidal activities	Not specify	[516]
Antibacterial, antifungal, anticariogenic, free radical scavenging, antihyperglycemic, antineoplastic, gastroprotective, antinociceptive and diuretic	Whole plant	[517]
Analgesic, Antibiotic, Antihyperlipidemic, Anti-inflammatory, Antimicrobial, Antioxidant, Antipyretic, Cytotoxic, Congestive enhancing, Gingival bleeding, Gastric ulcer, Hypotensive activity.	Not specify	[518]

Table 46-4 Toxicity assessment of *Mimusops elengi* Linn.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Bark	The methanolic extract exhibited good cytotoxic activity with LC50 value of 40 µg/ml.	[519]
MTT assay: TK6 (Human B-lymphoblastoid), HeLa (Human cervical carcinoma), KB (Human oral cavity carcinoma), HepG2 (Human hepatoma), HT-29 (Human colon adenocarcinoma) and MCF-7 (Human breast adenocarcinoma) and two normal cell lines; Vero	Flower	The methanolic extract showed high cytotoxicity against six cancerous cell lines including TK6, HeLa, HepG2, HT-29, MCF-7 and KB with CC50 values of 179.38, 379.06, 442.61, 500.66, 517.98 and 541.06 µg/ml, respectively; exhibited cytotoxic activity against two normal cell lines; L929 and Vero with CC50 of 493.96 and 413.69 µg/ml, respectively.	[219]
Acute toxicity:	Flowers and leaves	The LD50 of the methanolic extracts of both flowers and	[520]

Oral administration of albino rats at doses of 10, 100, 1000 mg/kg for phase I while 2000, 3000, 4000, and 5000 mg/kg for phase II.		leaves were greater than 5000 mg /kg body weight. No death of animal was recorded.	

Leaf and Flower

Figure 55 of *Mimusops elengi* Linn. [521]

47. *Momordica charantia* L.

Scientific name: *Momordica charantia* L.

Synonyms: *Momordica charantia* var. *longirostrata* Cogn.

Momordica charantia var. *muricata* Griseb., 1860

Momordica charantia var. *pseudobalsamina* Griseb.

Momordica charantia var. *zeylanica* Hitchc.

Momordica jagorana K.Koch

Common name: Gourds

Local name: Mara

Family: Cucurbitaceae

Distribution: Found covering bushes or rocks, along the edge of the forest at an altitude of 420-500 meters above sea level.

Parts Used: Leaf, Fruit

Description of the Plant: Ivy of terrestrial liana. Long pubescent, with thin herb stems, grooved, green. The mature fruit of wild pear is 2 to 7 cm long and 1.4 to 2 cm wide. The leaves are webbed, alternate, simple and palmate in appearance. Horseshoe-shaped, radially symmetrical. The stripes on the right side of the insert and squares with obtuse cross-sections have hairy surfaces, mucous margins, cusps, cleft bases, and hairy surfaces. There are two oblique flowers that bloom every day for 100 days. Female flowers do not produce nectar, while male flowers produce nectar

throughout the germination period. Fruit formation is due to cross-pollination and self-pollination. The plant also produces single yellowish or white flowers, and the green, berry-like fruit when immature turns yellow-orange when ripe. The seeds are covered with a red substance and are edible.[522].

Table 47-1 Traditional uses of *Momordica charantia* L.

Traditional uses	Parts Used	Reference
Antidiabetic	Leaf	[523]
Relieve aches and pains.	Leaf and fruit	

Table 47-2 Chemical constituents of *Momordica charantia* L.

Chemical constituents	Parts Used	Reference
Flavonoids and saponin	Fruit	[524]
Alkaloids, tannins, saponins, flavonoids, cardiac glycosides and steroids	Not specify	[522]

Table 47-3 Biological and pharmacological activities of *Momordica charantia* L.

Activities	Parts Used	Reference
Anticancer	Fruit	[525, 526]
Antihypertension	Leaf	[527]
Antioxidant	Fruit	[528]

Antidiabetic, hypolipidemic, antioxidant, anti-inflammatory	Not specify	[523]
Antiviral and antibacterial		
Anti-Inflammatory	Fruit	[524]
Neuroprotective	Fruit	[529]

Table 47-4 Toxicity assessment of *Momordica charantia* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Fruit	The ethanolic extract showed LC50 value >2000 µg/ml.	[529]
MTT assay: SH-SY5Y neuroblastoma cells.	Fruit	The SH-SY5Y cells treated with concentrations of charantin (isolated from this plant) ranging from 0.05 to 5 mg/ml showed none of toxic effects.	[392]

Acute toxicity: Oral administration of Wistar rats at a dose of 2000 mg/kg.	Foliage	The aqueous extract caused no death and no toxic signs of rats.	[523]

Leaf and fruit with seed

Figure 56 of *Momordica charantia* L. [530]

48. *Musa sapientum* L.

Scientific name: *Musa sapientum* L.

Synonyms: *Musa paradisiaca* L.

Musa paradisiaca subsp. *sapientum* (L.) Kuntze

Musa paradisiaca var. *sapientum* (L.) Kuntze

Musa paradisiaca subsp. *sapientum* (L.) Kuntze ex K.Schum.

Common name: Laccntan, Sucrier, Red Fig Banana, Martinigue Banana, Traveller's tree

Local name: Kluai-Namwan

Family: Musaceae

Distribution: All over the world

Parts Used: Fruit, Leaf

Description of the Plant: Perennial tree-like herbs 5-9m high, with hard rhizomes and long pseudostems. The inflorescences are large with reddish-brown bracts and are eaten as vegetables. Banana plants can grow 10 to 26 feet long [531].

Table 48-1 Traditional uses of *Musa sapientum* L.

Traditional uses	Parts Used	Reference

Diarrhea, dysentery, intestinal lesions, diabetes, uremia, nephritis, gout, hypertension, cardiac disease, and TB (tuberculosis)	Fruit (raw)	[532]
Jaundice	Fruit (ripe)	[533]

Table 48-2 Chemical constituents of *Musa sapientum* L.

Chemical constituents	Parts Used	Reference
Flavonoids, carbohydrates, reducing sugar, tannins, saponins, anthraquinones, steroids, alkaloids, glycosides, phytosterols, phenols and terpenoids	Not specify	[534]
Anthocyanins, phenolic acids, flavanones, terpenoids	Not specify	[535]

Table 48-3 Biological and pharmacological activities of *Musa sapientum* L.

Activities	Parts Used	Reference
Antimicrobial	Fruit	[536]
Antimycobacterial	Fruit	[532]
Anti-tuberculosis		
Antidiabetic	Flowers, Leaves, Pseudostems,	[537]

	Roots, Stalks, Peels	
Antimicrobial, antiulcerogenic, galactagogue, anti-inflammatory, anti-hyperglycemic, and antidiabetic, α-glucosidase and α-amylase inhibitory, antioxidant	Not specify	[535]

Table 48-4 Toxicity assessment of *Musa sapientum* L.

Toxicity assessment	Parts Used	Results	References
MTT assay: Human Umbilical Vein Endothelial Cell line (HUVEC), human colorectal carcinoma cell line (HCT-116) and human hormone sensitive and invasive breast cancer cell line (MCF-7).	Peel and pulp	The hexane extracts showed the highest cytotoxicity towards HCT-116 and MCF-7 with inhibition of 62.04 and 61.21 respectively, but poor cytotoxicity against the normal cell line (HUVEC).	[538]

Acute toxicity: Oral administration of Wistar rats at a dose up to 5000 mg/kg body weight.	Unripe fruits	The LD50 of aqueous extract was greater than 5000 mg/kg.	[539]

A: Fruit with leaf[540] B: Bud[535] C: Fruit[536]

Figure 57 of *Musa sapientum* L.

49. *Musa x paradisiaca* L.

Scientific name: *Musa x paradisiaca* L.

Synonyms: *Karkandela malabarica* Raf.

Musa acuminata x M. balbisiana

Musa acutibracteata M.Hotta

Musa alphurica Miq.

Musa aphurica Rumph.

Musa aphurica Rumph. ex Sagot

Musa arakanensis F.W.Ripley

Musa arakanensis F.W.Ripley ex Blechynden

Musa bacoba Rottb.

Musa balbisiana var. *vittata* (W.Ackm. ex Rodigas) M.R.Almeida

Musa berteroi Colla

Musa bidigitalis De Wild.

Musa carolinae Sterler

Musa champa Baker

Musa chapara Perr.

Musa chiliocarpa Backer

Musa chiliocarpa Backer ex K.Heyne

Musa corbieri A.Chev.

Musa corniculata Lour.

Musa dacca Horan.

Musa decrescens De Briey ex De Wild.

Musa decrescens var. *pembuki* De Briey

Musa decrescens var. *pembuki* De Briey ex De Wild.

Musa decrescens var. *rubromaculata* De Briey

Musa decrescens var. *rubromaculata* De Briey ex De Wild.

Musa decrescens var. *viridis* De Briey

Musa decrescens var. *viridis* De Briey ex De Wild.

Musa discolor Planch.

*Musa emasculat*a De Briey

*Musa emasculat*a De Briey ex De Wild.

*Musa emasculat*a var. *kiala* De Briey

*Musa emasculat*a var. *kiala* De Briey ex De Wild.

*Musa emasculat*a var. *kimbende* De Briey

*Musa emasculat*a var. *kimbende* De Briey ex De Wild.

*Musa emasculat*a var. *lomba* De Briey

*Musa emasculat*a var. *lomba* De Briey ex De Wild.

*Musa emasculat*a var. *zengani* De Briey

*Musa emasculat*a var. *zengani* De Briey ex De Wild.

Musa humilis Perr.

Musa maculata Jacq.

Musa mensaria Moench

Musa nigra Perr.

Musa odorata Lour.

Musa oleracea infrasubsp. descr

Musa ornata var. *normalis* Kuntze

Musa paradisiaca f. dongila De Briey

Musa paradisiaca f. dongila De Briey ex De Wild.

Musa paradisiaca f. funu-nua De Briey

Musa paradisiaca f. funu-nua De Briey ex De Wild.

Musa paradisiaca f. kilola De Briey

Musa paradisiaca f. kilola De Briey ex De Wild.

Musa paradisiaca f. seluka De Briey

Musa paradisiaca f. seluka De Briey ex De Wild.

Musa paradisiaca f. tuba De Briey

Musa paradisiaca f. tuba De Briey ex De Wild.

Musa paradisiaca subsp. *normalis* Kuntze

Musa paradisiaca subsp. *sapientum* (L.) Kuntze

Musa paradisiaca subsp. *sapientum* (L.) Kuntze ex K.Schum.

Musa paradisiaca var. *acicularis* G.Forst.

Musa paradisiaca var. *bende* De Briey

Musa paradisiaca var. *bende* De Briey ex De Wild.

Musa paradisiaca var. *bilul* De Briey

Musa paradisiaca var. *bilul* De Briey ex De Wild.

Musa paradisiaca var. *champa* (Baker) K.Schum.

Musa paradisiaca var. *cinerea* Blanco

Musa paradisiaca var. *coarctata* G.Forst.

Musa paradisiaca var. *compressa* Blanco

Musa paradisiaca var. *coriacea* G.Forst.

Musa paradisiaca var. *corniculata* G.Forst.

Musa paradisiaca var. *dacca* (Horan.) K.Schum.

Musa paradisiaca var. *exsicca* G.Forst.

Musa paradisiaca var. *fatua* G.Forst.

Musa paradisiaca var. *glaberrima* Blanco

Musa paradisiaca var. *glauca* Blanco

Musa paradisiaca var. *kitebbe* De Briey

Musa paradisiaca var. *kitebbe* De Briey ex De Wild.

Musa paradisiaca var. *lacatan* Blanco

Musa paradisiaca var. *longa* Blanco

Musa paradisiaca var. *lunaris* G.Forst.

Musa paradisiaca var. *magna* Blanco

Musa paradisiaca var. *martabarica* (Baker) K.Schum.

Musa paradisiaca var. *maxima* Blanco

Musa paradisiaca var. *mensaria (*Baker) K.Schum.

Musa paradisiaca var. *mensaria* G.Forst.

Musa paradisiaca var. *odorata* (Lour.) K.Schum.

Musa paradisiaca var. *oleracea* (Vieill.) K.Schum.

Musa paradisiaca var. *papillosa* G.Forst.

Musa paradisiaca var. *punctata G*.Forst.

Musa paradisiaca var. *purpurascens* G.Forst.

Musa paradisiaca var. *regia* (Baker) K.Schum.

Musa paradisiaca var. *regia* G.Forst.

Musa paradisiaca var. *rubra* (Firminger ex Baker) K.Schum.

Musa paradisiaca var. *sanguinea* (Welw. ex Baker) K.Schum.

Musa paradisiaca var. *sapientum* (L.) Kuntze

Musa paradisiaca var. *suaveolens* Blanco

Musa paradisiaca var. *subrubea* Blanco

Musa paradisiaca var. *ternatensis* Blanco

Musa paradisiaca var. *tetragona* G.Forst.

Musa paradisiaca var. *tombak* Blanco

Musa paradisiaca var. *ulnaris* Blanco

Musa paradisiaca var. *violacea* (Baker) K.Schum.

Musa paradisiaca var. *violacea* Blanco

Musa paradisiaca var. *viridis* De Briey

Musa paradisiaca var. *viridis* De Briey ex De Wild.

Musa paradisiaca var. *vittata* (W.Ackm. ex Rodigas) K.Schum.

Musa protractorachis De Wild.

Musa purpureotomentosa De Wild.

Musa sapidisiaca K.C.Jacob

Musa sapientum L.

Musa sapientum f. dubia King

Musa sapientum subsp. *paradisiaca* (L.) Baker

Musa sapientum var. *americana* N.G.Teodoro

Musa sapientum var. *angao* Quisumb.

Musa sapientum var. *baca* Quisumb.

Musa sapientum var. *binutig* N.G.Teodoro

Musa sapientum var. *canara* N.G.Teodoro

Musa sapientum var. *canaya* Quisumb.

Musa sapientum var. *champa* (Baker) Baker

Musa sapientum var. *cinerea* (Blanco) N.G.Teodoro

Musa sapientum var. *compressa* (Blanco) N.G.Teodoro

Musa sapientum var. *cubensis* N.G.Teodoro

Musa sapientum var. *dacca* (Horan.) Baker

Musa sapientum var. *daryao* N.G.Teodoro

Musa sapientum var. *dinalaga* Quisumb.

Musa sapientum var. *dool* Quisumb.

Musa sapientum var. *dubia* (King) A.M.Cowan & Cowan

Musa sapientum var. *eda* Quisumb.

Musa sapientum var. *fieleto* De Briey

Musa sapientum var. *fieleto* De Briey ex De Wild.

Musa sapientum var. *flabellata* Quisumb.

Musa sapientum var. *galatayan* Quisumb.

Musa sapientum var. *garangao* N.G.Teodoro

Musa sapientum var. *glaberrima* (Blanco) N.G.Teodoro

Musa sapientum var. *glauca* (Blanco) N.G.Teodoro

Musa sapientum var. *grandis* N.G.Teodoro

Musa sapientum var. *humilis* Merr.

Musa sapientum var. *inarnibal* N.G.Teodoro

Musa sapientum var. *kinamay* Quisumb.

Musa sapientum var. *lacatan* (Blanco) N.G.Teodoro

Musa sapientum var. *longa* (Blanco) N.G.Teodoro

Musa sapientum var. *martabarica* Baker

Musa sapientum var. *mensaria* Baker

Musa sapientum var. *odorata* (Lour.) Baker

Musa sapientum var. *oleracea* Baker

Musa sapientum var. *padilat* Quisumb.

Musa sapientum var. *pamotion* Quisumb.

Musa sapientum var. *paradisiaca* (L.) Baker

Musa sapientum var. *pelipia* Quisumb.

Musa sapientum var. *principe* Quisumb.

Musa sapientum var. *putian* Quisumb.

Musa sapientum var. *raines* Quisumb.

Musa sapientum var. *regia* (G.Forst.) Baker

Musa sapientum var. *rubra* Firminger

Musa sapientum var. *rubra* Firminger ex Baker

Musa sapientum var. *sanguinea* Welw.

Musa sapientum var. *sanguinea* Welw. ex Baker

Musa sapientum var. *sarocsoc* Quisumb.

Musa sapientum var. *satama* De Briey

Musa sapientum var. *satama* De Briey ex De Wild.

Musa sapientum var. *sision* Quisumb.

Musa sapientum var. *suaveolens* (Blanco) N.G.Teodoro

Musa sapientum var. *ternatensis* (Blanco) N.G.Teodoro

Musa sapientum var. *tombak* (Blanco) N.G.Teodoro

Musa sapientum var. *tudlong* N.G.Teodoro

Musa sapientum var. *tuldoc* N.G.Teodoro

Musa sapientum var. *violacea* (Blanco) N.G.Teodoro

Musa sapientum var. *violacea* Baker

Musa sapientum var. *vittata* (W.Ackm. ex Rodigas) Hook.f.

Musa vittata W.Ackm.

Musa vittata W.Ackm. ex Rodigas

Musa xconsociata Nakai

Musa xdulcissima Nakai

Musa xingrata Nakai

Musa xjaheri Nakai

Musa xmegalocarpa Nakai

Musa xmirabilis Nakai

Musa xoleracea Vieill.

Musa xpallida Nakai

Musa xparadisiaca var. *paradisiaca* L.

Musa xpolycarpa Nakai

Musa xprematura Nakai

Musa xsapientum f. dubia Baker

Musa xsapientum var. *suaveolens* (Blanco) Malag.

Musa xtrichocarpa Nakai

Common name: French plantain

Local name: Kluai-hom

Family: Musaceae

Distribution: Asian, now widely found tropical and subtropical countries

Parts Used: Peel

Description of the Plant: A herbaceous plant up to 9 m long with stout dendritic pseudostems, large oblong dark green leaf crowns with prominent midribs, individual inflorescences per plant drooping spikes, large bracts open in sequence, eggs Shaped and 15-20 cm long, concave, dark red, slightly fleshy. The fruit is oblong, fleshy, the peel is thicker than other bananas, the inflorescence is large, and has reddish-brown bracts, which can be eaten as a vegetable. Ripe fruit is sweet and juicy with plump seeds [541].

Table 49-1 Traditional uses of *Musa x paradisiaca* L.

Traditional uses	Parts Used	Reference
Venereal diseases and anaemia.	Root	[542]
Peptic ulcer disease.	Not specify	[541]

Table 49-2 Chemical constituents of *Musa x paradisiaca* L.

Chemical constituents	Parts Used	Reference
Rutin	Leaf	[543]

Cellulose, hemicelluloses, arginine, aspartic acid, glutamic acid, leucine, valine, phenylalanine and threonine	Pulp and peel	[541]

Table 49-3 Biological and pharmacological activities of *Musa x paradisiaca* L.

Activities	Parts Used	Reference
Antibacterial, antihyperglycaemic	Flower	[544]
Antibacterial activity	Pulp	[545]
Antiulcerogenic, antioxidant and antimicrobial activity	Fruits, peel, leaves, roots and pseudostem	[543]

Table 49-4 Toxicity assessment of *Musa x paradisiaca* L.

Toxicity assessment	Parts Used	Results	References
Acute toxicity test Swiss Albino mice	Leaf	Aqueous fraction using gave an LD50 of 489.9 mg/kg body weight which indicates a relative toxicity of the extract.	[542]

Brine shrimp lethality assay (BSLA)	Root	The extract did not show significant toxicity at concentration range of 15.6-1000μg/ml.	[546]
MTT assay: DU-145 human prostate cancer cell lines and HeLa (human cervical cancer) cells.	Florets	The ethyl acetate fraction exhibited cytotoxicity against DU-145 with IC50 value of 37.94 μg/ml. The commercial chemotherapeutic drug, 5-fluorouracil showed IC50 of 32.50 μg/ml.	[547]
Acute toxicity: Oral administration of rats at a dose of a single dose of 500, 1000, 2000 and 5000 mg/kg.	Fruit	The aqueous extract showed no toxicity signs or death and an LD50 value of >5 g/kg.	[548]

Figure 58 of *Musa x paradisiaca* L.[541]

50. *Myristica fragrans* Houtt.

Scientific name: *Myristica fragrans* Houtt.

Synonyms: *Aruana silvestris* Burm.fil.

Myristica amboinensis Gand.

Myristica americana Rottb.

Myristica aromatica Lam.

Myristica aromatica Sw.

Myristica laurella Gand.

Myristica moschata Thunb.

Myristica officinalis L.fil.

Myristica philippinensis Gand.

Palala fragrans (Houtt.) Kuntze

Common name: Rou Dou Ku

Local name: Jun

Family: Myristicaceae

Distribution: Native of Banda Islands of Eastern Indonesia

Parts Used: Seed, Flower

Description of the Plant: A dioecious, bushy evergreen plant. 9-12 meters high. The fruit is a single seed, fleshy, lobed, smooth, 6-9 cm long and almost as wide. When ripe, the aromatic yellow orange peel, approximately 1.3 cm thick, is divided in half along the suture, exposing the seeds. [549].

Table 50-1 Traditional uses of *Myristica fragrans* Houtt.

Traditional uses	Parts Used	Reference
Treat diarrhea, rheumatism, headaches, psychosis, fever, bad breath, nausea, stomach cramps, chronic vomiting, hemorrhoids, and to stimulate appetite, and to control fatulence. Used in some medicines as an aphrodisiac, an abortifacient, a narcotic, and as a tonic after child birth. In the form of an ointment, nutmeg butter is used as a mild external stimulant to treat sprains and paralysis	Not specify	[550]

Table 50-2 Chemical constituents of *Myristica fragrans* Houtt.

Chemical constituents	Parts Used	Reference
Lignans, neolignans, diphenylalkanes, phenylpropanoids, terpenoids, alkanes, fatty acids, fatty acid esters, and a few minor constituents such as steroids, saponins, triterpenoids, and favonoids	Not specify	[550]
Alkaloids, saponins, anthraquinones, cardiac glycosides, flavonoids and phlobatanins	Seed	[551]

Table 50-3 Biological and pharmacological activities of *Myristica fragrans* Houtt.

Activities	Parts Used	Reference
Antioxidant and strong antimicrobial against important pathogenic bacteria and fungi	Seed	[552]
Hallucinogenic properties	Seed	[550]

Table 50-4 Toxicity assessment of *Myristica fragrans* Houtt.

Toxicity assessment	Parts Used	Results	References
Acute toxicity: Oral administration Wistar albino rats.	Seed	The aqueous extract showed , prolonged use at high doses could be very toxic.	[551]
Brine shrimp lethality assay (BSLA)	Fruit	The essential oil showed LC_{50} value of 5434.78 ± 23.2 µg/ml.	[553]
MTT assay: Jurkat cells (human leukemia cell line) .	Bark	The methanolic extracts at the concentrations 50 and 100 µg/mL significantly reduced viability of Jurkat cells.	[554]

Acute toxicity: Oral administration of BALB/c mice at a dose of 2, 3, 4, 5, and 6 g/kg for 72 h.	Seed	The alkaloid extract showed LD50 value of 5.1 g/kg.	[555]

A: Fruit with Leaf B: Seed from the fruit

Figure 59 of *Myristica fragrans* Houtt.[556]

51. *Nicotiana tabacum* L.

Scientific name: *Nicotiana tabacum* L.

Synonyms: *Nicotiana alba* Mill.

Nicotiana alipes Steud.

Nicotiana attenuata Steud.

Nicotiana capensis Vilm.

Nicotiana caudata Nutt.

Nicotiana chinensis Fisch.

Nicotiana chinensis Fisch. ex Lehm.

Nicotiana crispula hort.

Nicotiana crispula hort. ex Steud.

Nicotiana doniana Dunal

Nicotiana florida Salisb.

Nicotiana frutescens Hort.Amstel.

Nicotiana frutescens Hort.Amstel. ex Lehm.

Nicotiana fruticosa L.

Nicotiana fruticosa Moc. & Sessé

Nicotiana fruticosa Moc. & Sessé ex Dunal

Nicotiana gigantea Hort.Dorpat.

Nicotiana gigantea Hort.Dorpat. ex Lehm.

Nicotiana gracilipes Steud.

Nicotiana guatemalensis Bailly

Nicotiana guatemalensis hort.

Nicotiana guatemalensis hort. ex Vilm.

Nicotiana havanensis Hort.Matrit.

Nicotiana havanensis Hort.Matrit. ex Lehm.

Nicotiana lancifolia C.Agard

Nicotiana lancifolia C.Agardh ex Steud.

Nicotiana lancifolia Willd.

Nicotiana lancifolia Willd. ex Lehm.

Nicotiana latissima Mill.

Nicotiana lehmanni C.Agardh

Nicotiana lehmanni C.Agardh ex Dunal

Nicotiana lingua Steud.

Nicotiana loxensis Kunth

Nicotiana macrophylla Spreng.

Nicotiana marylandica Schübl.

Nicotiana marylandica Schübl. ex Dunal

Nicotiana mexicana Schltdl.

Nicotiana mexicana var. *rubriflora* Dunal

Nicotiana nepalensis Link & Otto

Nicotiana nepalensis Link & Otto ex Dunal

Nicotiana pallescens Steud.

Nicotiana petiolaris Schltdl

Nicotiana petiolaris Schltdl. ex Duna

Nicotiana petiolata C.Agardh

Nicotiana pilosa Dunal

Nicotiana repanda Sim

Nicotiana serotina Steud.

Nicotiana tabaca St.-Lag.

Nicotiana tabacum f. fruticosa (L.) Voss

Nicotiana tabacum subsp. *undulata* Sendtn.

Nicotiana tabacum var. *alipes* Schrank

Nicotiana tabacum var. *angustifolia* Aiton

Nicotiana tabacum var. *attenuata* Schrank

Nicotiana tabacum var. *brasiliensis* Comes

Nicotiana tabacum var. *goyanum* Glaz.

Nicotiana tabacum var. *gracilipes* Schrank

Nicotiana tabacum var. *lancifolia* (Willd. ex Lehm.) Comes

Nicotiana tabacum var. *latissima* (Mill.) Voss, 1894

Nicotiana tabacum var. *lingua* Schrank

Nicotiana tabacum var. *loxensis* Kuntze

Nicotiana tabacum var. *macrophylla* (Spreng.) Schrank

Nicotiana tabacum var. *pallescens* Schrank

Nicotiana tabacum var. *serotina* Schrank

Nicotiana tabacum var. *subcordata* Sendtn.

Nicotiana tabacum var. *undulata* Sendtn.

Nicotiana tabacum var. *verdon* Schrank

Nicotiana tabacum var. *virginica* (C.Agardh) Comes

Nicotiana turcica Haberle

Nicotiana turcica Haberle ex Steud.

Nicotiana verdon Steud.

Nicotiana virginica C.Agardh

Nicotiana ybarrensis Kunth

Tabacum latissimum Bercht. & Opiz

Tabacum nicotianum Bercht. & Opiz

Tabacum ovatofolium Gilib.

Common name: Tobacco

Local name: Ya-sup

Family: Solanaceae

Distribution: Tropics and subtropics and some temperate zones

Parts Used: Leaf

Description of the Plant: It grows to up to 2.5 m with large ovate green leaves and terminal clusters of tubular white-pinkish flowers[557].

Table 51-1 Traditional uses of *Nicotiana tabacum* L.

Traditional uses	Parts Used	Reference
Relieve joint pain, flatulence, headache	Leaf	[557]
Insecticide, anesthesia, diaphoresis, sedative and emetic	Aerial part	[558]

Table 51-2 Chemical constituents of *Nicotiana tabacum* L.

Chemical constituents	Part of the plant	Reference
Oil gosaccharides, proteins, sterols, therpenic alcohols.	Seed	[559]
Cembranic diterpenoids, diterpenoids, alkaloids, sesquiterpenes, sterols, flavonoids, coumarins, lignans, aliphatics, sucrose esters, phenylpropanoids, aliphatics, sucrose esters and polyphenol	Flower	[558]

Table 51-3 Biological and pharmacological activities of *Nicotiana tabacum* L.

Activities	Part of the plant used	Reference
Antioxidant, antimicrobial and cytotoxic	Root	[557]
Antimicrobial	Leaf	[560]

Table 51-4 Toxicity assessment of *Nicotiana tabacum* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	The LC50 value of methanolic extract was 77.09 µg/ml.	[561]
MTT assay: The anti-proliferative activity of human breast cancer cells (MCF-7) and normal African green monkey kidney epithelial (Vero) cell lines.	Leaf	The LC50 value of flavonoid (methanolic extract) were 148.41 µg/ml for MCF-7 cell and 255.35 µg/ml for Vero cell lines.	[562]
Acute toxicity: Oral administration of Winstar rats at a dose of 5000 mg /kg for 14 days.	Leaf	The bio-oil was not toxic because there was no mortality and no significant change in the body weight and behavior of the rats.	[563]
MTT assay: HepG2, A549 and HCT-116 cell lines.	Flower	Seventeen cembranoids and analogues were	[558]

		isolated from this plant and two of them were assessed for their anti-tumor activities against HepG2, A549 andHCT-116 cell lines. Only compound 5 exhibited moderate activity against Hep-G2 cell lines.	

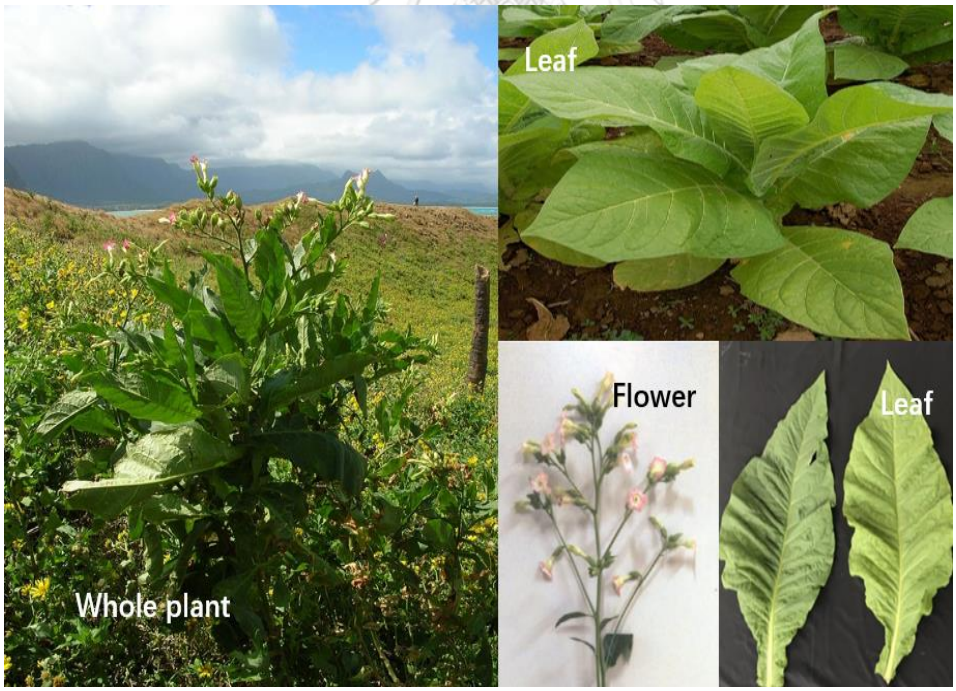


Figure 60 of *Nicotiana tabacum* L. [564, 565]

52. *Ocimum africanum* Lour

Scientific name: *Ocimum africanum* Lour

Synonyms: *Ocimum americanum* var. *pilosum* (Willd.) A.J.Paton

Ocimum basilicum var. *anisatum* Benth.

Ocimum basilicum var. *pilosum* (Willd.) Benth.*Ocimum citriodorum* Vig.

Ocimum citriodorum Vis.

Ocimum graveolens A.Br.

Ocimum petitianum A.Rich.

Ocimum pilosum Roxb.

Ocimum pilosum Willd.

Common name: Hoary basil

Local name: Maeng-lak

Family: Lamiaceae/ Labiatae

Distribution: Tropical and subtropical Asia, Africa and south America

Parts Used: Leaf

Description of the Plant: Herbaceous annual plants with square stem, decussate leaves, lips-shaped flower, with strong lemon scent [566].

Table 52-1 Traditional uses of *Ocimum africanum* Lour

Traditional uses	Parts Used	Reference
Cough, expectorant, headache, antiflatulence, antifungal and antiemetic, insecticide, fungicidal activity, antibacterial activity, larvicidal activity	Leaf	[567]
Complementary foods, skin diseases	Not specify	[568]
Good aroma or flavour/fragrance, perfumery, aromatherapy, pharmaceutical, in lemon tea, soups, fish, curries, seafood, meal preparation, beef, and agro-industry	Leaf	[569]
Colds and coughs, indigestion, stomach pain, diarrhea, nausea, ulcers, ringworm and asthma. It is also known to lower blood sugar, and increase lactation.	Not specify	[570]

Table 52-2 Chemical constituents of *Ocimum africanum* Lour

Chemical constituents	Parts Used	Reference
Caryophyllene, citronellol	Leaf	[569]
Alkaloids, anthocyanins, cardio glycosides, coumarins, Flavonoid, glycosides, phenols, quinones, saponins, steroid, terpenoids and tannins	Leaf	[568]
Neral(36.8%), geranial (33.4%), (E)caryophyllene (3.5%), and l inalool (3.1%), whereas the oil from the north-eastern part comprised neral (21.1%), geranial	Arial part	[567]

(15.6%), linalool (8.9%), (E)caryophyllene (7.7%), germacrene D (5.5%), and alphahumulene (3.5%). Finally, the essential oil from the southern part contained neral (24.4%), geranial (22.8%), methyl chavicol (9.4%), linalool (5.6%), and (E)-caryophyllene (5.5%)		

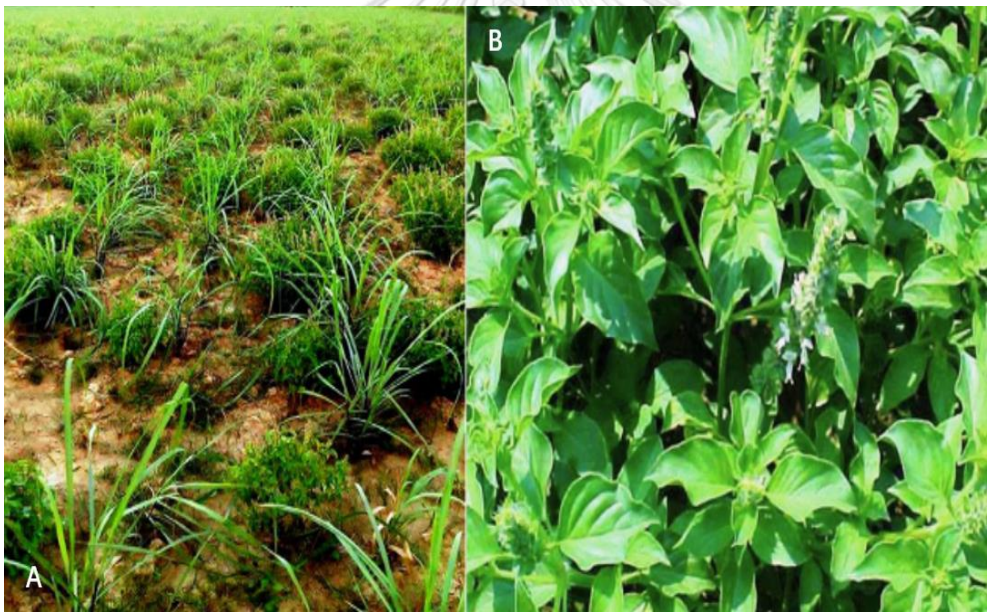
Table 52-3 Biological and pharmacological activities of *Ocimum africanum* Lour

Activities	Parts Used	Reference
Antioxidant, antifungals and antiemetics	Leaf	[568]

Table 52-4 Toxicity assessment of *Ocimum africanum* Lour

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	The aqueous extract at a concentration of 10 to 1000 µg/ml did not show notable toxicity.	[571]
MTT assay: Human cervical cancer cell line (HeLa), human laryngeal epithelial carcinoma cell line (HEp-2) and NIH 3T3	Leaf	The essential oil showed cytotoxic effect on HeLa, HEp-2 and NIH 3T3 cell lines with IC50 values of	[572]

mouse embryonic fibroblasts.		90.5, 96.5 and 120.7 mg/ml, respectively.	
Acute toxicity: Oral administration of Wistar rats at dose of 50, 500, 1,000, and 2000 mg/kg.	Whole plant, leaf, flower, bulb, root etc.	The hydro-alcoholic extract at a dose of 2 g/kg did not induce deaths or toxic symptoms.	[573]



A: Whole plant B: Leaf with fower

Figure 61 of *Ocimum africanum* Lour [569]

53. Ocimum tenuiflorum L.

Scientific name: *Ocimum tenuiflorum* L.

Synonyms: *Geniosporum tenuiflorum* (L.) Merr.

Lumnitzera tenuiflora (L.) Spreng.

Moschosma tenuiflorum (L.) Heynh.

Ocimum anisodorum F.Muell.

Ocimum caryophyllinum F.Muell.

Ocimum frutescens Burm.f., 1768

Ocimum hirsutum Benth.

Ocimum inodorum Burm.f.

Ocimum monachorum L.

Ocimum sanctum L.

Ocimum sanctum var. *angustifolium* Benth.

Ocimum sanctum var. *cubensis* Gomes

Ocimum scutellarioides Willd.

Ocimum scutellarioides Willd. ex Benth.

Ocimum subserratum B.Heyne

Ocimum subserratum B.Heyne ex Hook.f.

Ocimum tenuiflorum f. villicaulis Domin

Ocimum tenuiflorum var. *anisodorum* (F.Muell.) Domin

Ocimum tomentosum Lam.

Ocimum villosum Roxb.

Plectranthus monachorum (L.) Spreng.

Common name: Holy Basil, Sacred basil

Local name: Ka-phrao

Family: Lamiaceae/ Labiatae

Distribution: South Asia

Parts Used: Leaf, Whole plant

Description of the Plant: Erect, much-branched accessory shrub, 3462 cm tall, simple opposite green or purple; leaves: dark green to green, opposite, stipules, absent, petioles ovate, up to 5 cm, usually slightly toothed; margin : serrated, flowers: vertical, 5-7 mm long, calyx; color green, 5, corolla; lips, scattered hairs, petals white, stamens: 4, filaments 1 mm long, filament color white; none Ovary; single pattern white, stems covered with fine hairs, fruit seedless; seeds numerous; seeds small and white in color [574].

Table 53-1 Traditional uses of *Ocimum tenuiflorum* L.

Traditional uses	Parts Used	Reference
Common cold, stomach disorders, headache, and heart disease, inflammation, malaria, and diverse forms of poisoning	Not specify	[574]

Table 53-2 Chemical constituents of *Ocimum tenuiflorum* L.

Chemical constituents	Parts Used	Reference
Essential oils, tannins, flavonoids, steroids/triterpenoids. alkaloids, flavonoids, glycosides, triterpenoids/steroids, tannins, and saponins	Leaf	[575]
Fixed oils, essential oils, triterpenes, flavonoids, flavonoid glycosides, polysaccharides, phenolic glycoside, lignans, and norlignans	Not specify	[574]

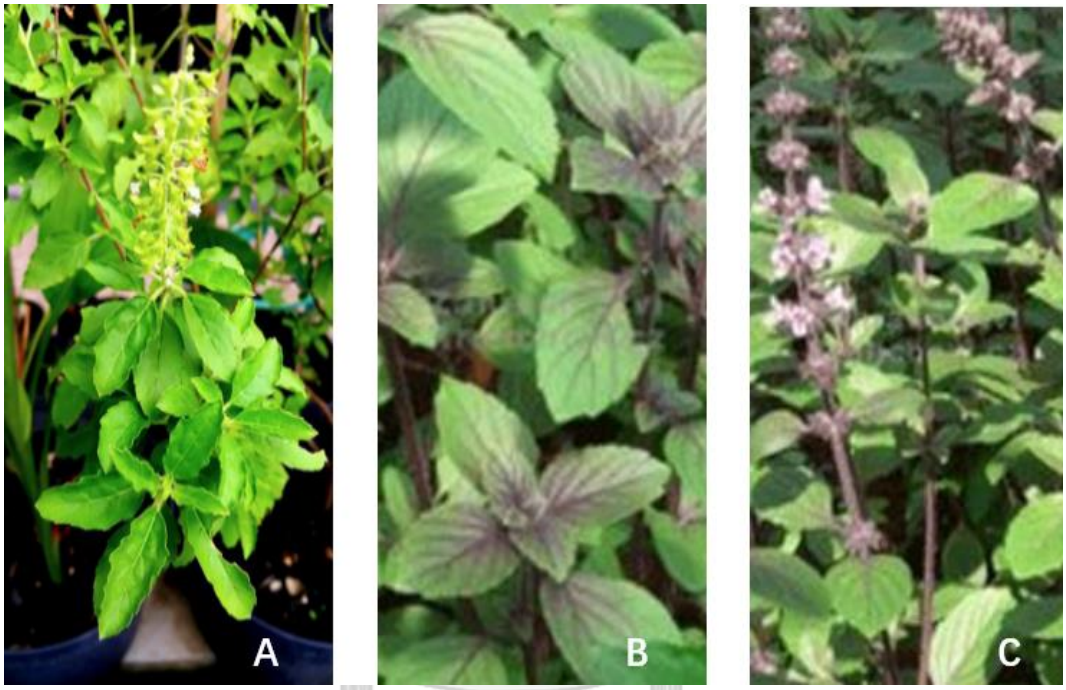
Table 53-3 Biological and pharmacological activities of *Ocimum tenuiflorum* L.

Activities	Parts Used	Reference
Antioxidant	Not specify	[576, 577]
Antiproliferative	Leaf	[577]
Anticarcinogenic	Not specify	[578]
Anticancer	Leaf	[579]
Immunostimulatory effect, gastric antiulcer activity, diabetics mellitus, hyperlipidemia, wound healing effects, protective effect, chemopreventive activity	leaves, seeds ad stem	[574]

Table 53-4 Toxicity assessment of *Ocimum tenuiflorum* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Leaf	The LC50 value of methanolic extract was 91.56 µg/ml.	[580]
MTT assay: three breast cancer cells (MCF-7, MDA-MB-231 and MDA-MB-453).	Leaf	The IC50 values of ethanolic extract for MCF-7, MDA-MB-231 and MDA-MB-453 cells were 29.3±2.1, 37.2±2.8 and 33.4±2.2 µg/ml.	[577]
MTS assay: KB (oral squamous cell carcinoma) cells.	Whole plant (Tulsi oil extract product)	The IC50 value of oil extract was 100 µg/ml.	[578]
Acute toxicity: Oral administration of diabetic induced Sprague Dawley rats at a dose of 2000 mg/kg for 14 days.	Leaf	Various extract (chloroform, ethyl acetate, methanol and water) administrations did not cause any changes or strange behavior except hexane extract which shows	[581]

		weight loose, few rats died and diarrhea in some rats.	



A: Whole plant [575] B: Leaf [574] C: Flower [574]

Figure 62 of *Ocimum tenuiflorum* L.

54. *Oldenlandia biflora* L.

Scientific name: *Oldenlandia biflora* L.

Synonyms: *Hedyotis biflora* (Linn.) Lam.

Common name: Two-flower mille graines

Local name: Mak-dib-nam-kang

Family: Rubiaceae

Distribution: Asia–Pacifc regions and the east and west coasts of India

Parts Used: Stem

Description of the Plant: Can grow to a height of 15-30 cm; stems quadrangular or subterete and/or grooved, glabrous; flowers arranged in racemoid panicles, quadrangular fruits; seeds spherical, deeply pitted [582].

Table 54-1 Traditional uses of *Oldenlandia biflora* L.

Traditional uses	Parts Used	Reference
Gastric ulcers, inflammation, skin diseases, appendicitis, boils, dysentery, hepatitis and tonsillitis	Not specify	[582]
Treat various cancers, including pancreatic cancer	Leaf, Root	[583]

Table 54-2 Chemical constituents of *Oldenlandia biflora* L.

Chemical constituents	Parts Used	Reference
Anthraquinones, alkaloids, flavonoids, tannins and cyclotides	Not specify	[582]
Hedyotide B1	Not specify	[584]

Table 54-3 Biological and pharmacological activities of *Oldenlandia biflora* L.

Activities	Parts Used	Reference
Antimicrobial	Not specify	[584]

Table 54-4 Toxicity assessment of *Oldenlandia biflora* L.

Toxicity assessment	Parts Used	Results	References
MTT assay: Human pancreatic cancer cell lines BxPC3, capan2, MOH1 and PANC1.	Leaf, Root	All five hedyotides isolated from this plant showed significant cytotoxicity on four kinds of pancreatic cancer cell lines with IC50 values of 0.36-3.11 μM.	[583]

Whole plant (young shoot)

Figure 63 of *Oldenlandia biflora* L.

55. *Piper betle* Linn.

Scientific name: *Piper betle* Linn.

Synonyms: *Artanthe hexagyna* Miq.

Betela mastica Raf.

Chavica betle (L.) Miq.

Chavica blumei Miq.

Chavica canaliculata (Opiz) C.Presl

Chavica chawya C.DC.

Chavica chuvya Miq.

Chavica densa Miq.

Chavica siriboa (L.) Miq.

Cubeba melamiri Miq.

Cubeba seriboa (L.) Miq.

Cubeba siriboa (L.) Miq.

MacroPiper potamogetonifolium (Opiz) Miq.

Peperomia betle L.

Piper anisodorum Blanco

Piper anisodorum Náves

Piper anisodorum Náves ex Fern.-Vill.

Piper bathicarpum C.DC.

Piper betel Blanco

Piper betel L.

Piper betle f. densum (Blume) Fosberg

Piper betle f. *marianum* (Opiz) Fosberg

Piper betle subsp. *densum* (Blume) C.DC.

Piper betle subsp. *densum* (Blume) Fosberg

Piper betle subsp. *mariannum* (Opiz) C.DC.

Piper betle subsp. *marianum* (Opiz) Fosberg

Piper betle var. *densum* (Blume) C.DC.

Piper betle var. *fenixii* (C.DC.) Quisumb.

Piper betle var. *macgregorii* (C.DC.) Quisumb.

Piper betle var. *marianum* (Opiz) C.DC.

Piper betle var. *siriboa* (L.) C.DC.

Piper bidentatum Stokes

Piper blancoi Merr.

Piper blumei (Miq.) Backer

Piper canaliculatum Opiz

Piper carnistilum C.DC.

Piper chawya (Miq.) Buch.-Ham.

Piper chuvya (Miq.) Miq.

Piper densum Blume

Piper fenixii C.DC.

Piper macgregorii C.DC.

Piper malamiri Blume

Piper malamiris L.

Piper malarayatense C.DC.

Piper marianum Opiz

Piper philippinense C.DC.

Piper pinguispicum C.DC. & Koord.

Piper potamogetonifolium Opiz

Piper puberulinodum C.DC.

Piper saururus Burm.

Piper siriboa L.

Piperi betlum (L.) St.-Lag.

Common name: Betel pepper

Local name: Ploo

Family: Piperaceae

Distribution: Southeast Asia

Parts Used: Leaf

Description of the Plant: Perennial semi-woody climbing plant, dioecious with a strong spicy aroma, with thick stems [585]. This vine is a creeping perennial with leaves 4-7 inches long and 2-4 inches wide [586].

Table 55-1 Traditional uses of *Piper betle* Linn.

Traditional uses	Parts Used	Reference
Mixed with black pepper were said to be used as a contraceptive by women	Root	[587]
Prevent bad breath (halitosis), improve vocalization, strengthen the gum, conserve the teeth, and sweeten breath, Treat catarrhal inflammation and as a disinfectant	Leaf	[586]

Table 55-2 Chemical constituents of *Piper betle* Linn.

Chemical constituents	Parts Used	Reference
Ascorbic acid, gallic acid, catechin, caffeic acid, syringic acid, rutin, p-coumaric acid, sinapic acid, ferrulic acid, myricetin, quercetin, apigenin, kaempferol, and eugenol	Leaf	[585]
Phenyl propene, diketosteroid, aristololactam A-II.	Root	[587]
Caryophyllene, cadinene, γ-lactone, allyl catechol, p-cymene and eugenol methyl ether in varying amounts	Leaf	
Carvacrol, chavicol, chavibetol, hydroxychavicol, eugenol, eugenol methyl ether, methyl eugenol, eucalyptol, estragole, allyl catechol, 4-	Whole plant	[586]

hydroxycatechol, cadinene, β-caryophyllene, γ-lactone, p-cymene, cepharadione A, dotriacontanoic acid, tritriacontane, α-terpinene,α-terpineol-2-3, dotriacontanoic acid, pentatriacontane, hentriacontane, stearic acid, triotnacontane, n-triacontanol, piperlonguminine, allylpyrocatechol diacetate, isoeugenol, α-pinene, β-pinene, 1, 8-cineol, β-sitosterol, γ-sitosterol, stigmasterol, palmitate, ursolic acid, and ursolic acid 3-acetate		

Table 55-3 Biological and pharmacological activities of *Piper betle* Linn.

Activities	Parts Used	Reference
Antioxidant, antimicrobial, and anticarcinogenic	Leaf	[585]
Antimicrobial, anticariogenic, antilarval, antiprotozoal, antiallergic, antidiabetic, anti-inflammatory, hepatoprotective, antiulcer, cardioprotective, anti-hyperlipidaemic, antiplatelet, vasorelaxation, and immunomodulatory effects	Leaf	[586]

Table 55-4 Toxicity assessment of *Piper betle* Linn.

Toxicity assessment	Parts Used	Results	References

Brine shrimp lethality assay (BSLA)	Leaf	The ethanolic extract showed LC_{50} value of 44.97 µg/ml.	[588]
MTT assay: K562 (chronic myelocytic), Molt4 (human lymphoblastic), HL60 (human promyelocytic), and U937 (human monocytic) leukemic cell lines.	Leaf	The ethanolic extract showed cytotoxicity effects against K562, Molt4, HL60, and U937 cells with IC50 values of 36.2±1.1, 19.7±1.6, 28.9±5.6, and 17.3±0.7 µg/ml, respectively.	[589]

A: Whole plant B: Leaf

Figure 64 of *Piper betle* Linn.[585]

56. *Piper nigrum* L.

Scientific name: *Piper nigrum* L.

Synonyms: *Muldera multinervis* Miq.

Piper aromaticum Lam.

Piper baccatum C.DC.

Piper colonum C.Presl

Piper denudatum Opiz

Piper glyphicum Hoffmanns.

Piper glyphicum Hoffmanns. ex Kunth

Piper malabarense C.DC.

Piper rotundum Noronha

Rhyncholepis haeankeana Miq.

Common name: Black pepper

Local name: Phrik-thai

Family: Piperaceae

Distribution: Tropics

Part used: Fruit

Description of the Plant: The plant can reach up to 50–60 cm in height and is characterized by its simple, alternate leaves, with a few rare cases of opposite or verticillate leaves [590].

Table 56-1. Traditional uses of *Piper nigrum* L.

Traditional uses	Parts Used	Reference
Diarrhea, earache, gangrene, cardiovascular diseases, indigestion, and insomnia, Relieve stomach pain, vomiting, gastric expelling, diarrhea, toothache, flatulence, indigestion, cure headache, expel nutrients. Helps appetite, sweating, diuretic, stimulates the nerves	Fruit and seed	[591]
Appetizer drug	Seed	[592]
Asthma, cough, diabetes and heart problems	Seed	[593]

Table 56-2. Chemical constituents of *Piper nigrum* L.

Chemical constituents	Part of the plant	Reference
Pellitorine	Not specify	[594]
Piperine	Fruit	[595]
B-Caryophyllene, Limonene, **B**-pinene, Piperine, Piperolein	Essential oil, Oleoresins	[596]

Table 56-3. Biological and pharmacological activities of *Piper nigrum* L.

Activities	Part of the plant used	Reference
Anti-Cancer	Not specify	[594, 597, 598]
Antioxidant	Seed, fruit	[592, 596, 598-600]
Anxiolytic and antidepressant	Fruit	[595]
Immunomodulatory	Not specify	[597]
Antiarthritic, Hepatoprotective, Antifertility, Antiulcer, Antifungal, and central nervous system depressant	Fruit	[601]
Analgesic, Antiinflammatory, Anticonvulsant, Cognitive-enhancing	Fruit	[595]
Anti-Inflammatory	Fruit	[595, 601-603]
Antidepressant, Antispasmodic, Antidiarrheal, Antiasthmatic, Antifungal	Not specify	[598]
Antimicrobial	Not specify	[598, 604]

Table 56-4. Toxicity assessment of *Piper nigrum* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp cytotoxic activity	Seed	Essential oils showed significant cytotoxic activity on brine shrimp nauplii	[605]
MTT assay: Four breast cancer cell lines (MCF-7, MDA-MB-231, MDA-MB468, and ZR-75-1); a neuroblastoma (SK-N-SH); and a normal breast (MCF-12A) cell line	Fruit	The dichloromethane extract showed effective against MCF-7 cells with an IC50 value of 7.45 mg/ml.	[591]
Acute toxicity: Oral administration of ICR mice at a dose of 5000 mg/kg for 14 days.	Fruit	The dichloromethane extract showed no adverse effects or mortality, there for, IC50 value higher than 5000 mg/kg.	[445]

A: Leaf [606] B: Seed [126, 605]

Figure 65 of *Piper nigrum* L.

57. *Rhinacanthus nasutus* (Linn.) Kurz.

Scientific name: *Rhinacanthus nasutus* (Linn.) Kurz.

Synonyms: *Rhinacanthus nasutus* (L.) Kuntze

Dianthera 357ylvatica357 Lour.

Justicia dichotoma Rottler

Justicia gendarussa Macrae

Justicia gendarussa Macrae ex Nees

Justicia macilenta E.Mey.

Justicia nasuta L.

Justicia odoratissima Bojer

Justicia odoratissima Bojer ex Nees

Justicia rottleriana Wall.

Justicia 357ylvatica Nees

Justicia sylvatica Vahl

Pseuderanthemum connatum Lindau

Rhinacanthus communis Nees

Rhinacanthus macilentus C.Presl

Rhinacanthus nasutus (L.) Kurz

Rhinacanthus nasutus (L.) Lindau

Rhinacanthus rottlerianus Nees

Family: Acanthaceae

Common name: Snake jasmine

Local name: Thong-phan-chang

Distribution: Tropical and subtropical regions

Parts Used: Whole plant

Description of the Plant: The plant is 60-76 cm in height, leaves are ovate to oblong, sparsely to densely pubescent, and 4-6 cm long, base rounded to cordate, apex short acuminate. Flowers are violet [607].

Table 57-1 Traditional uses of *Rhinacanthus nasutus* (Linn.) Kurz.

Traditional uses	Parts Used	Reference
Quenching fever, poisoning, killing the parasite, the root is boiled and drunk as an antidote, also an ethnomedical plant used in the traditional system of medicine for treating skin diseases.	Whole plant	[608]
Antidote for snake bites	Leaf, Root, Seed	[609]

Table 57-2 Chemical constituents of *Rhinacanthus nasutus* (Linn.) Kurz.

Chemical constituents	Parts Used	Reference
Rhinacasutone, Rhinacanthone, Rhinacanthins, Heliobuphthalmin	Root	[610]

The lignans rhinacanthin	Aerial part	[609]
The Benzenoids compounds p-hydroxy-benzaldehde, vanillic acid, syringic acid, 2 methoxy propiophenone, methyl valinate and syringaldehyde	Leaf, Root, Stem	

Table 57-3 Biological and pharmacological activities of *Rhinacanthus nasutus* (Linn.) Kurz.

Activities	Parts Used	Reference
Pediculicidal and pesticidal	Leaf	[608]
Antioxidant	Leaf	[608, 611]
Antiviral	Root	[610]
Antidiabetic	Leaf	[612]
Anti-herpes simplex virus type 2	Stem	[613]
Anti-oxidant, pediculicidal and pesticidal	Leaf	[608]

Table 57-4 Toxicity assessment of *Rhinacanthus nasutus* (Linn.) Kurz.

Toxicity assessment	Parts Used	Results	References
MTT assay:	Stem	The ethanolic, methanolic,	[613]

vero cell infected with HSV-2		ethylacetate, dichloromethane, acetone and hexane showed IC_{50} values of 42.87±9.07, 78.22±13.38, 23.68±8.28, 23.29±7.11, 21.85±6.65 and 22.28±6.13 µg/ml, respectively.	
Resazurin microplate assay: African green monkey kidney fibroblast (Vero) cells; KB (human epithelial carcinoma cells), MCF-7 and NCI-H187.	Leaf	Four new naphthoquinones isolated from this plant; rhinacanthin A (5) showed cytotoxicity against MCF-7 cell line with IC50 value of 8.79 µM, rhinacanthin N (15) showed active against NCI-H187 cell line and Vero cells with IC50	[614]

		values of 2.24 μM and 3.00 μM.	

A: Whole plant [610] B: Leaf [613]

Figure 66 of *Rhinacanthus nasutus* (Linn.) Kurz.

58. *Sesamum indicum* L.

Scientific name: *Sesamum indicum* L.

Synonyms: *Sesamum auriculatum* C.Presl

Sesamum brasiliense Vell.

Sesamum occidentale Heer & Regel

Sesamum oleiferum Sm.

Strobilanthes gentiliana H.Lév.

Common name: Seasame

Local name: Nga

Family: Pedaliaceae

Distribution: Tropical regions

Parts Used: Seed, Oil, Leaf

Description of the Plant: Flower's white. the annual plant reaches height of 6 feet and sprouts along leaves and seed pods [615].

Table 58-1 Traditional uses of *Sesamum indicum* L.

Traditional uses	Parts Used	Reference
Replenishing liver and kidney, enriching vitality and blood	Seed	[616]
Treatment for cough, cold and also used as nutritive, laxative, demulcent and emollient properties.	Seed	[617]

Table 58-2 Chemical constituents of *Sesamum indicum* L.

Chemical constituents	Parts Used	Reference
Gallic, Pyrogallol, Protocatechuic, Catechol, Catechin, Chlorogenic, Caffeic, Vanillic, Caffeine, Ferulic, Ellagic, Cinnamic, Benzoic, Syringic, Chrysin, p-Coumaric	Seed	[618]
Naphthoquinone derivatives; chlorosesamone, hydroxysesamone and epoxysesamone, anthraquinones derivatives; anthrasesamone A, anthrasesamone B, anthrasesamone C, anthraquinone and anthraquinone	Root	[619]

Table 58-3 Biological and pharmacological activities of *Sesamum indicum* L.

Activities	Parts Used	Reference
Anti-oxidant, anti-inflammatory anti-diabetic, nephroprotective	Seed	[620]
Wound healing	Seed and oil	[621]
Vasorelaxant	Root	[619]
Antioxidant, antimelanogenic, skin-protective	Not specify	[622]
Antitumor	Flower	[616]

Table 58-4 Toxicity assessment of *Sesamum indicum* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Seed	The ethanolic extract and aqueous extract showed LC50 values of 61.85 µg/ml and 1.7 µg/ml.	[617]
MTT assay: Human breast cancer cell line (MCF-7).	Seed	The plant extract gave IC50 value of 148.76 µg/ml.	[623]
MTT assay: Human cervical carcinoma cell lines (Hela); KB cell lines (CNE-2); human hepatoma carcinoma cell lines (smmc-7721); and human esophagus squamous carcinoma cell lines (Kyse-410)	Flower	The petroleum benzene fraction and diethyl ether fraction showed significant antitumor activity.	[616]

Toxicity test: Oral administration of Wistar rats at doses of 10-5000 mg/kg body weight.	Seed	The LD50 of ethanolic extract is above 5000 mg/kg body weight.	[624]

A: Whole plant B: Flower C: Seed capsule D: Seed

Figure 67 of *Sesamum indicum* L. [625]

59. *Shorea siamensis* Miq.

Scientific name: *Shorea siamensis* Miq.

Synonyms: *Hopea suavis* Wall.

Pentacme malayana King

Pentacme siamensis (Miq.) Kurz

Pentacme suavis A.DC.

Pentacme tomentosa Craib

Shorea bracteata Pierre ex Laness.

Shorea mekongensis Pierre ex Laness.

Shorea siamensis var. *tomentosa* (Craib) Smitinand

Shorea suavis (A.DC.) Pierre ex Laness.

Shorea tomentosa Pierre

Vateria siamensis (Miq.) Burck

Common name: Dark red meranti, Light red meranti, Red lauan

Local name: Teng-rang

Family: Dipterocarpaceae

Distribution: Myanmar, Indochina, Thailand, Laos

Parts used: Leaf

Description of the Plant: Deciduous erect large trees, up to 30m in height, more than 80cm in diameter, gray or reddish-brown bark, 1.5cm thick, with deep cracks.

Leaves ovate or oval, flowers bisexual, calyx 5 petals, red narrow ellipse. Oval fruit.

[626].

Table 59-1 Traditional uses of *Shorea siamensis* Miq.

Traditional uses	Parts used	Reference
Treatment of dysentery	Bark	[627]

Table 59-2 Chemical constituents of *Shorea siamensis* Miq.

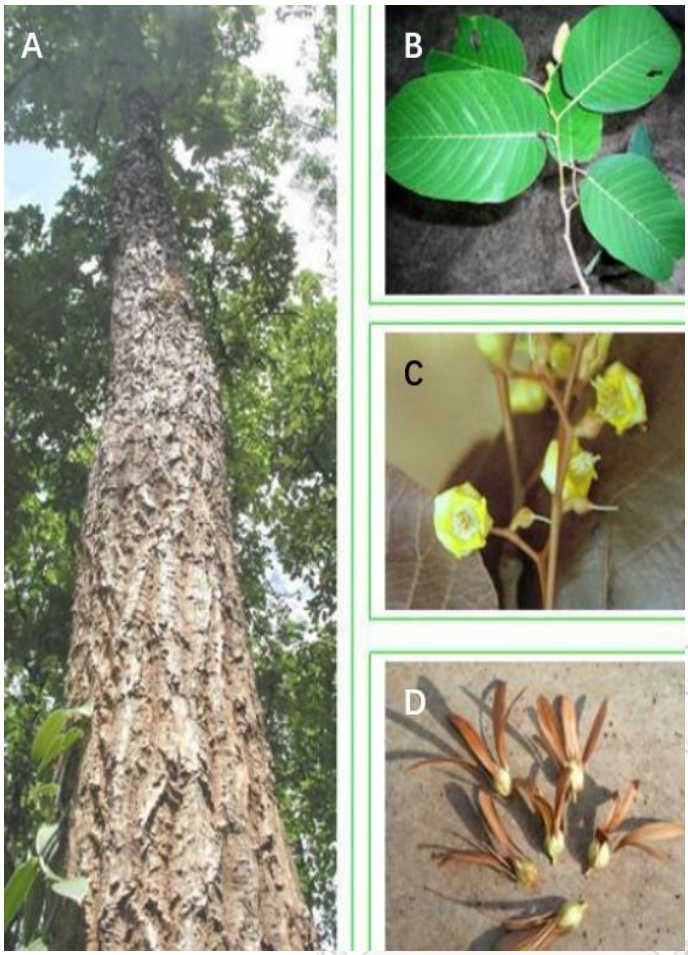
Chemical constituents	Parts used	Reference
Resveratrol trimer, anigopreissin, gnetin c, hopeafuran	Stem bark	[628]

Table 59-3 Biological and pharmacological activities of *Shorea siamensis* Miq.

Activities	Parts used	Reference
Anti-HIV	Bark	[628]

Table 59-4 Toxicity assessment of *Shorea siamensis* Miq.

No result since not record was found in online database reseach.



A: Stem and bark B: Leaf C: Flower D: Flower

Figure 68 of *Shorea siamensis* Miq. [629]

60. *Solanum melongena* Linn.

Scientific name: *Solanum melongena* Linn.

Synonyms: *Melongena esculenta* Grecescu

Melongena incurva Mill.

Melongena ovata Mill.

Melongena spinosa Mill.

Melongena teres Mill.

Solanum album Noronha

Solanum album var. *richardii* Dunal

Solanum album var. *rumphii* Dunal

Solanum edule Schum. & Thonn.

Solanum esculentum Dunal

Solanum heteracanthum Dunal

Solanum incurva (Mill.) Corrêa

Solanum indicum Roxb.

Solanum insanum L.

Solanum lagenarium Dunal

Solanum longum Roxb.

Solanum melanocarpum Dunal

Solanum melanocarpum var. *atropurpureum* Dunal

Solanum melongena subsp. *Agreste* Dikii

Solanum melongena subsp. *Depressum* L.

Solanum melongena subsp. *Insanum* (L.) Banfi, Galasso & Bartolucci

Solanum melongena subsp. *Leucoum* Alef.

Solanum melongena var. *angustum* Dikii

Solanum melongena var. *cylindricum* Dikii

Solanum melongena var. *depressum* L.

Solanum melongena var. *esculentum* (Dunal) Nees

Solanum melongena var. *esculentum* (Dunal) Walp.

Solanum melongena var. *giganteum* (Alef.) Dikii

Solanum melongena var. *globosi* Dikii

Solanum melongena var. *leucoum* (Alef.) Dikii

Solanum melongena var. *ovigera* Pers.

Solanum melongena var. *racemiflorum* Dikii

Solanum melongena var. *racemosum* Dikii

Solanum melongena var. *serpentinum* L.

Solanum melongena var. *serpentinum* L.H.Bailey

Solanum melongena var. *stenoleucum* (Alef.) Dikii

Solanum melongena var. *variegatum* (Alef.) Dikii

Solanum melongena var. *violaceum* (Alef.) Dikii

Solanum melongena var. *viride* Dikii

Solanum melongenum St.-Lag.

Solanum oviferum Salisb.

Solanum ovigerum Dunal

Solanum ovigerum var. *album* Sweet

Solanum ovigerum var. *insanum* Blume

Solanum ovigerum var. *luteum* Sweet

Solanum ovigerum var. *oblongo-cylindricum* Dunal

Solanum ovigerum var. *ruber* Sweet

Solanum ovigerum var. *violaceum* Sweet

Solanum plumieri Dunal

Solanum pressum Dunal

Solanum pseudoundatum Blume

Solanum pseudoundatum var. *albiflorum* Blume

Solanum pseudoundatum var. *atropurpurascens* Blume

Solanum pseudoundatum var. *leucocarpon* Blume

Solanum requienii Dunal

Solanum sativum Dunal

Solanum sativum var. *albiflorum* (Blume) Dunal

Solanum sativum var. *atropurpurascens* (Blume) Dunal

Solanum sativum var. *leucocarpon* (Blume) Dunal

Solanum schoenbrunnense Dunal

Solanum serpentinum Noronha

Solanum spinosa (Mill.) Corrêa

Solanum tomentosum Hesb.Hasselt

Solanum tomentosum Hesb.Hasselt ex Miq.

Solanum trilobatum Noronha

Solanum trongum Poir.

Solanum trongum var. *divaricatum* Dunal

Solanum trongum var. *rumphii* Dunal

Solanum trongum var. *sinuatopinnatifidum* Dunal

Solanum undulatum Poir.

Solanum violaceum DC.

Solanum violaceum DC. Ex Dunal

Solanum zeylanicum Scop.

Common name: Eggplant

Local name: Ma-kuea-yao

Family: Solanaceae

Distribution: Asia

Parts Used: Flower, Fruit

Description of the Plant: A bushy perennial shrub that can grow to a height of 60 to 120 cm with tough, thorny stems with an erect or spreading growth habit [630].

Table 60-1 Traditional uses of *Solanum melongena* Linn.

Traditional uses	Parts Used	Reference
Asthma, allergic rhinitis, nasal catarrh, skin infections, rheumatic disease and swollen joint pains, gastro-esophageal reflux disease, constipation	Fruit	[631]

Table 60-2 Chemical constituents of *Solanum melongena* Linn.

Chemical constituents	Parts Used	Reference
Kaempferol	Leaf	[632]
Glycosides of delphinidin	Fruit peel	[632]
Anthocyanin	Not specify	[632]
Caffeic acid and chlorogenic acid, chlorogenic acid	Not specify	[633]
Phenylpropanoid	Root	[634]
Terpenes and lignans	Root	[631]
Anthocyanin; delphinidine-3-(p-cumaroylrutinoside)5-glucoside (nasunin)	Fruit peel	[635]

Table 60-3 Biological and pharmacological activities of *Solanum melongena* Linn.

Activities	Parts Used	Reference

Antioxidant	Fruit, Stalk	[632, 633, 636]
Antidiabetic, Anticancer, Hypolipidemic	Fruit	[636]
Anti-Inflammatory	Peel, Root	[632, 634, 636]

Table 60-4 Toxicity assessment of *Solanum melongena* Linn.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Fruit peel	The dead of nauplii was found 26, 48, 50 and 62% at 0.1, 1.0, 10 and 100 µg/ml concentrations of the extract [ethanol: chloroform: acetic acid (65: 32: 3)] respectively.	[637]
Sulphorhodamine B assay (SRB): Five human cancer cell lines: colon cancer cell line (HCT116); larynx cancer cell line (HEP2); breast cancer	Fruit peel	The methanolic extract showed cytotoxic against five cancer cell lines with IC50 values of 4.36 ± 0.32 µg/ml for HCT116; 4.99 ± 0.36 µg/ml for HEP2; 6.56 ± 0.32 µg/ml for MCF7; 4.90 ± 0.21	[635]

cell line (MCF7); cervix cancer cell line (HELA) and liver cancer cell line (HEPG2).		µg/ml for HELA; and 2.14 ± 0.35 µg/ml for HEPG2 cell lines.	
Acute toxicity test: Oral administration of Wistar rat at a dose of 1000, 1600, 2900 and 5000 mg/kg for 24 hours.	Fruit	An aqueous extract showed no death of animals treated. This means that LD50 > 5000 mg/Kg.	[638]

A: Flower B: Fruit

Figure 69 of *Solanum melongena* Linn. [630]

61. *Spondias pinnata* (L.f.) Kurz

Scientific name: *Spondias pinnata* (L.f.) Kurz

Synonyms: *Evia amara* Comm.

Evia amara Comm. ex Blume

Mangifera pinnata L.fil.

Poupartia acuminata (Roxb.) Wall.

Poupartia pinnata (L.fil.) Blanco

Spondias acuminata Roxb.

Spondias amara Lam.

Spondias bivenomarginalis K.M.Feng & P.I Mao

Spondias macrophylla Wall.

Spondias mangifera Willd.

Spondias paniculata Roxb.

Spondias paniculata Roxb. ex Wight & Arn.

Spondias sinensis Lour.

Spondias sinensis Lour. ex Steud.

Wirtgenia decandra Jungh.

Common name: Hog plum

Local name: Ma-kok

Family: Anacardiaceae

Distribution: Southeast Asia

Parts Used: Fruit

Description of the Plant: Deciduous tree, 10-25 m tall, broadly branched, yellowish-brown, lanceolate, petiole 10-15 cm, petiole and petiole glabrous, leaf blade 30-40 cm, pinnately compound and opposite leaves 5 -11 leaves; petiole 3-5 mm; leaf blades ovate-oblong to elliptic-elliptic, 7-12 × 4-5 cm., paper, glossy on both sides, base cue to rounded, usually sloping, serrated or total margin, pointed apex, 12-25 pairs of lateral veins, slightly convex, adaxially convex, posterior prominent, connected to the veins of collection below the edge Inflorescence paniculate, apex 25-35 cm, glabrous, branching 10-15 cm. Flowers sessile or sessile, white, neat, calyx sepals triangular, 0.5 mm, petals oblong-ovate, approx. 2.5 × 1.5. mm, with pointed tip, stamens 1.5 mm, ovate subglobose, ca. 1 mm, style 4 or 5, free, approx. 0.5 mm Drupe, ovate to oval-oval. When ripe, yellow-orange, 3.5-5 × 2.5-3.5 cm. Endocarps are wood inside and fibrous grooves. Ripe fruits usually have 2 or 3 seeds. Flowering April-June. Fruiting August-September (Wu et al. 1994-2013) Fruit oval to oval, oval-ovate, olive-green to orange-yellow when ripe, 35-70*25-35 mm long. On the outside it is fibrous. Ripe fruits usually have two to three seeds. [639].

Table 61-1 Traditional uses of *Spondias pinnata* (L.f.) Kurz

Traditional uses	Parts Used	Reference

Urolithiasis, heartburn, and diabetes and to boost overall body health	Leaf	[640]
Dysentery, muscular rheumatism, and diabetes mellitus	Bark	

Table 61-2 Chemical constituents of *Spondias pinnata* (L.f.) Kurz

Chemical constituents	Parts Used	Reference
Methyl caffeate and rhamnetin-3-O-sophoroside	Fruit	[640]
Stigmast-4-en-3-one, β-sitosterol, and β-sitosterol β-D-glucoside	Aerial part	

Table 61-3 Biological and pharmacological activities of *Spondias pinnata* (L.f.) Kurz

Activities	Parts Used	Reference
Hypoglycemic activity	Bark	[640]
Antidiabetic and antilipidemic	Fruit	
Antimicrobial and antiviral	Leaf	

Table 61-4 Toxicity assessment of *Spondias pinnata* (L.f.) Kurz

Toxicity assessment	Parts used	Results	References

Brine shrimp lethality assay (BSLA)	Bark	The ethyl acetate extract showed potential cytotoxic activity with LD50 equal to 0.178 µg/ml	[641]
MTT assay: Chronic myelogenous leukemia K562; colon carcinoma HCT116	Leaf	The aqueous plant extract showed cytotoxic effect with the IC50 with 82, 60, and 53µg/ ml for HCT 116; with 55, 35, and 24 µg/ml for K562 cells, respectively.	[642]
Acute toxicity: Oral administration of adult male rats of Wistar	Stem Bark	The aqueous plant extract showed not any changes in skin, fur, eyes and behavior of animals throughout the 28-day study	[643]

Leaf, Flower and Fruit [644]

Figure 70 of *Spondias pinnata* (L.f.) Kurz

62. *Syzygium aromaticum* L. Merr. & Perry

Scientific name: *Syzygium aromaticum* L. Merr. & Perry

Synonyms: *Caryophyllus aromaticus* L.

Caryophyllus hortensis Noronha

Caryophyllus silvestris Teijsm.

Caryophyllus silvestris Teijsm. Ex Hassk.

Eugenia aromatica (L.) Baill.

Eugenia caryophyllata Thunb.

Eugenia caryophyllus (Spreng.) Bullock & S.G.Harrison

Jambosa caryophyllus (Spreng.) Nied.

Myrtus caryophyllus Spreng.

Common name: Clove

Local name: Kan-phlu

Family: Myrtaceae

Distribution: Originate Maluku Islands of Indonesia

Parts Used: Flower bud

Description of the Plant: Conical myrtle, medium sized tree with straight trunk, 10 to 12 m tall. The leaves are large oblong or oval, opposite to single obovate, glabrous, with many oil glands on the lower surface. Blooms around 7 years old and continues to bloom for over 80 years. Flowers small, dark red, hermaphroditic, at the end of branchlets. There are 3 to 4 peduncles per peduncle, and the length of the

inflorescences is between 4 and 5 cm. The initial shoots are pale yellow and glossy, turning green to bright red when mature. [645].

Table 62-1 Traditional uses of *Syzygium aromaticum* L. Merr. & Perry

Traditional uses	Parts Used	Reference
Burns and wounds, and as a pain reliever in dental care as well as treating tooth infections and toothache, also	Flower bud	[265]
Asthma, digestive system disorder, dental disorders, respiratory disorders, headaches and sore throats, dyspepsia, gastritis, diarrhea	Flower bud	[646]
Burns and cuts, and it has also found use in dental care as a pain reliever, and undiluted clove oil may be rubbed on the gums for treating tooth infections and toothache	Leaf	[647]

Table 62-2 Chemical constituents of *Syzygium aromaticum* L. Merr. & Perry

Chemical constituents	Parts Used	Reference
Mainly eugenol, eugenyl acetate, β-caryophyllene, 2-heptanone, acetyleugenol, α-	Not specify	[648]

humulene, methyl salicylate, isoeugenol, methyleugenol.		
Eugenol, isocaryophyllene, b-caryophyllene, allo-aromadendrene, a-humulene, eugenol acetate, caryophyllene oxide	Flower bud	[649]

Table 62-3 Biological and pharmacological activities of *Syzygium aromaticum* L. Merr. & Perry

Activities	Parts Used	Reference
Against pathogenic bacteria including methicillin-resistant Staphylococcus epidermidis and S. aureus.	Flower Bud	[265]
Against parasites including Giardia lamblia, Fasciola gigantica, Haemonchus contortus, and Schistosoma mansoni		
Analgesic, antiseptic, antispasmodic, antineuralgic, carminative, anti-infectious, disinfectant, insecticide, stimulant, stomachic, uterine and tonic	Flower Bud	[650]
Anesthetic effect	Stem, Bud, Leaf	[645]
Antibacterial and antioxidant	Flower bud	[646]

Table 62-4 Toxicity assessment of Syzygium aromaticum L. Merr. & Perry

Toxicity assessment	Parts Used	Results	References
Neutral red (NR) assay: Human fibroblasts (153BR, HNDF); endothelial cells (HMEC-1)	Leaf	The clove oil showed NR50 value of 0.018%, 0.025% and 0.017% on HMEC-1, HNDF and 153BR, respectively.	[647]
MTT assay: Human colon carcinoma cells (HCT).	Buds	The ethanolic, dichloromethane, petroleum ether and acetonic extract showed cytotoxic activity against HCT cell line with IC50 values of 2.53, 6.71, 6.48 and 2.91 µg/ml, respectively.	[651]
Brine shrimp lethality assay (BSLA)	Fruit	The hydroethanolic extract showed LC50 value of 0.20 ± 0.04 mg/ml.	[652]
Brine shrimp lethality assay (BSLA)	Flower buds	The aqueous extract showed LC50 value of 20 µg/ml.	[653]

Acute toxicity: Oral administration of Wistar rats at doses of 1, 2 and 5 g/kg.	Flower buds	The hydroethanolic extract did not produce any mortality or adverse effects during the 14 days.	[654]

A: Leaf B: Flowers and fruits C: Dry clove

Figure 71 of *Syzygium aromaticum* L. Merr. & Perry [655]

63. *Tamarindus indica* L.

Scientific name: *Tamarindus indica* L.

Synonyms: *Cavaraea elegans* Speg.

Tamarindus erythraeus Mattei

Tamarindus indica var. *occidentalis* (Gaertn.) Taub., 1894

Tamarindus occidentalis Gaertn.

Tamarindus officinalis Hook.

Tamarindus somalensis Mattei

Tamarindus umbrosa Salisb.

Common name: Tamarind, Indian date

Local name: Ma-kham

Family: Fabaceae/Leguminosae

Distribution: Across three ecological regions in Benin

Parts Used: Fruit

Description of the Plant: Evergreen tree, about 24 m high, with a spreading crown. The bark is rough and gray. The leaves are alternate, compound leaves, and the opposite leaflets are oblong. The petioles and rachis are hairy, with pale yellow or pink flowers. The fruit is a pod, indehiscent, nearly cylindrical, straight or curved, soft, and the pulp is rusty brown. 3-10 seeds per pod, irregular in shape, the skin of the seeds is hard, smooth and shiny [656].

Table 63-1 Traditional uses of *Tamarindus indica* L.

Traditional uses	Parts Used	Reference
Snake bite	Seed	[657]
Diabetes	Not specify	[658]

Table 63-2 Chemical constituents of *Tamarindus indica* L.

Chemical constituents	Parts Used	Reference
Tannins, flavonoids and alkaloids	Not specify	[659]
Phenolic compounds	Not specify	[660]
flavonoids to total phenols		

Table 63-3 Biological and pharmacological activities of *Tamarindus indica* L.

Activities	Parts Used	Reference
Ameliorating effect	Fruit	[661]
Antitumor and Immunopotentiating	Seed kernel	[662]
Antiobesity	Pulp	[663]
Anti-Inflammatory, Antinociceptive	Leaf	[656, 664]
Anti-oxidant	Leaf, seed, Fruit Pulp	[665-668]
Antibacterial	Fruit pulp, stem bark and leaves	[659, 669]

Hypocholesterolaemic	Fruit Pulp	[668]
Antioxidant, Antimicrobial, Cytotoxic, Anti-Inflammatory, Antinematodal, Anti-Diabetic Activity	Not specify	[670]

Table 63-4 Toxicity assessment of *Tamarindus indica* L.

Toxicity assessment	Parts Used	Results	References
Brine shrimp lethality assay (BSLA)	Seed	The ethanolic and methanolic extracts showed LC50 values of lower than 100 μg/ml and greater than 30 μg/ml.	[670]
MTT Assay: cell viability assay on MCF-7 cell line	Seed	The n-butanol extract has a cytotoxic effect on the MCF-7 cell line with 72% inhibition of cell viability	[660]
Brine shrimp lethality assay (BSLA)	Stem bark	The ethanolic extract showed IC50 value of 1542 μg/ml.	[671]
MTT Assay: Hepatocellular carcinoma cell line,	Seed	The n-butanol fraction showed significant cytotoxic effect only on the MCF-7 cell	[660]

HePG 2; colon cell line, HCT116; lung carcinoma cell line, A549; breast cancer cell, MCF-7; prostate cell line, PC3 and the normal skin fibroblast, BJ1		line with IC50 value of 68.5 μg/ml.	

A: Whole plant [672] B: Leaf&fruit [672] C: Flower [673]

Figure 72 of *Tamarindus indica* L.

64. *Tiliacora triandra* (Colebr.) Diels

Scientific name: *Tiliacora triandra* (Colebr.) Diels

Synonyms: *Cocculus triandrus* Colebr.

Limacia amherstiana Miers

Limacia triandra (Colebr.) Hook.fil. & Thomson

Limacia triandra (Colebr.) Miers

Limacia wallichiana Miers

Menispermum triandrum Roxb.

Sebicea stipularis Pierre

Sebicea stipularis Pierre ex Diels

Tiliacora stipularis Pierre

Tiliacora stipularis Pierre ex Diels

Common name: Bamboo grass

Local name: Thao-wan-khiew or Ya-nang

Family: Menispermaceae

Distribution: Native to mainland Southeast Asia

Parts Used: Leaf, Bulb

Description of the Plant: It is a creeping shrub with slender, hairy or smooth stems. The leaves are ovate or lanceolate, about 6.5-11 cm long and 2-4 cm wide. It is a perennial plant with male and female flowers. The fruit is oval, 3-4 mm long.

There are branches. Roots vary in size. Twisted root surface is grayish-yellow with longitudinal wrinkles and cracks [674].

Table 64-1 Traditional uses of *Tiliacora triandra* (Colebr.) Diels

Traditional uses	Parts Used	Reference
Reducing blood sugar	Root, Leaf	[674]

Table 64-2 Chemical constituents of *Tiliacora triandra* (Colebr.) Diels

Chemical constituents	Parts Used	Reference
Condensed tannin, triterpene, flavonoid, saponin, phyrol and α-tocopherol. Polyphenols include p-hydroxybenzoic acid, minecoside, flavones glycoside cinnamic acids derivative, and monoepoxybetacarotene	Leaf	[675]
Alkaloids, flavonoids, tannins and saponins	Not specify	[676]
Alkaloids magnoflorine, nortiliacorine A, and tiliacorinin-2'- N-oxide, two new bisbenzylisoquinoline alkaloids (including Tilitriandrin), noryanangine and norisoyanangine	Aerial parts	[677]

Table 64-3 Biological and pharmacological activities of *Tiliacora triandra* (Colebr.) Diels

Activities	Parts Used	Reference
Anti-bacterial, anti-malarial, anti-cancer, antiinflammation, anti-oxidant, anti-fever, alcohol detoxification, and acetylcholine esterase (ache) inhibitory properties	Leaf	[675]
Antidiabetic	Root, Leaf	[674]
Antioxidant Property	Leaf	[676]

Table 64-4 Toxicity assessment of *Tiliacora triandra* (Colebr.) Diels

Toxicity assessment	Parts used	Results	References
MTT assay: Lymphocytes and HeLa (human cervical carcinoma) cell line.	Leaf	The methanolic extract showed lymphocyte viability at 72.78% when treated with the highest concentration of 10 mg/ml;	[676]

		HeLa cells viability at 50% (IC50) when treated with 0.41 mg/ml.	
Acute and sub-chronic toxicity: Oral administration of Male and female Sprague-Dawley rats weighing 130- 190 g	Whole plant	The aqueous extract did not showed signs of toxicity, or behavioral changes, mortality, changes on gross appearance or histopathological changes of internal organs.	[677]

A: Leaf B: Fruit

Figure 73 of *Tiliacora triandra* (Colebr.) Diels [676]

65. *Uraria crinita* (L.) Desv. ex DC.

Scientific name: *Uraria crinita* (L.) Desv. ex DC.

Synonyms: *Doodia crinita* (L.) Roxb.

Hedysarum comosum Vahl

Hedysarum crinitium L.

Hedysarum crinitum L.

Hedysarum lanseum Noronha

Onobrychis comosa Spreng.

Onobrychis crinita (L.) Spreng.

Uraria comosa DC.

Uraria comosa Span.

Uraria cornosa Span.

Uraria crinita (L.) Desv.

Uraria crinita subsp. *macrostachya* (Wall.) Schindl.

Uraria crinita var. *macrostachya* (Wall.) Schindl.

Uraria crinita var. *macrostachya* Wall.

Uraria macrostachya (Wall.) Prain

Uraria macrostachya (Wall.) Schindl.

Uraria macrostachya Wall.

Uraria picta Wight

Common name: Cat's Tail Plant

Local name: Ya-ta-khab

Family: Fabaceae/Leguminosae

Distribution: Widely in Taiwan

Parts Used: Stem and leaf

Description of the Plant: Leaflets usually obtuse or mucronate at apex [678].

Table 65-1 Traditional uses of *Uraria crinita* (L.) Desv. ex DC.

Traditional uses	Parts Used	Reference
Coordinate the gastrointestinal system	Root	[679]
Childhood skeletal dysplasia		

Table 65-2 Chemical constituents of *Uraria crinita* (L.) Desv. ex DC.

Chemical constituents	Parts Used	Reference
Fatty acids, steroids, triterpenoids, phenolics, lignans, flavonoids, and isoflavonoids	Not specify	[679]

Table 65-3 Biological and pharmacological activities of *Uraria crinita* (L.) Desv. ex DC.

Activities	Parts Used	Reference
Detumescent and antipyretic effects, indicating immunomodulatory activity	Root	[679]

Antioxidant and antidiabetic activities and the potential to stimulate bone formation and regeneration	Not specify	

Table 65-4 Toxicity assessment of *Uraria crinita* (L.) Desv. ex DC.

Toxicity assessment	Parts used	Results	References
Larvicidal activity against blow fly larvae (*Chrysomya megacephala*).	Leaf	Fresh and dry plant has a moderate larvicidal effect.	[680]
Cytotoxicity Assessment (CCK8 assay): Leukocytes; Dendritic cells (DCs).	Root	Isoflavone genistein in methanolic extract induced a significant level of DC death at 40 μM.	[679]

Leaf and fower [678]

Figure 74 of *Uraria* *399erpine* (L.) Desv. Ex DC.

66. *Zingiber montanum* Roxb. (*Zingiber montanum* (J.Koenig) Link ex A.Dietr.)

Scientific name: *Zingiber montanum* Roxb. (*Zingiber montanum* (J.Koenig) Link ex A.Dietr.)

Synonyms: *Amomum cassumunar* (Roxb.) Donn

Amomum montanum J.Koenig

Amomum montanum J.Koenig ex Retz.

Amomum xanthorhiza Roxb.

Amomum xanthorhiza Roxb. Ex Steud.

Cassumunar roxburghii Colla

Jaegera montana (J.Koenig) Giseke

Zingiber anthorrhiza Horan.

Zingiber cassumunar Roxb.

Zingiber cassumunar var. *palamauense* Haines

Zingiber cassumunar var. *subglabrum* Thwaites

Zingiber cliffordiae Andrews

Zingiber luridum Salisb.

Zingiber montanum (J.Koenig ex Retz.) Theilade

Zingiber montanum (J.Koenig) Link

Zingiber purpureum Roscoe

Zingiber purpureum var. *palamauense* (Haines) K.K.Khanna

Zingiber xantorrhizon Steud.

Common name: Bengal ginger

Local name: Plai

Family: Zingiberaceae

Distribution: India and tropical southeast Asia

Parts Used: Rhizome

Description of the Plant: Perennial rhizomous herb, All parts of the plant are aromatic with strong camphoraceous odors [681].

Table 66-1 Traditional uses of *Zingiber montanum* Roxb.

Traditional uses	Parts Used	Reference
Food coloring and additives, spices, traditional medicines, dyes, perfumes, and cosmetics	Rhizome	[681]
Constipation, dyspepsia, flatulence, stomach bloating, and as mosquito repellant.	Rhizome	[682]

Table 66-2 Chemical constituents of *Zingiber montanum* Roxb.

Chemical constituents	Parts Used	Reference
Sabinene (45.22- 47.86%), erpinene-4-ol (20.51-21.43%), and dimethyl phenyl, butadiene (10.12-11.68%)	Rhizome	[681]

Zerumbone, flavonoids, kaempferol	Rhizome	[682]

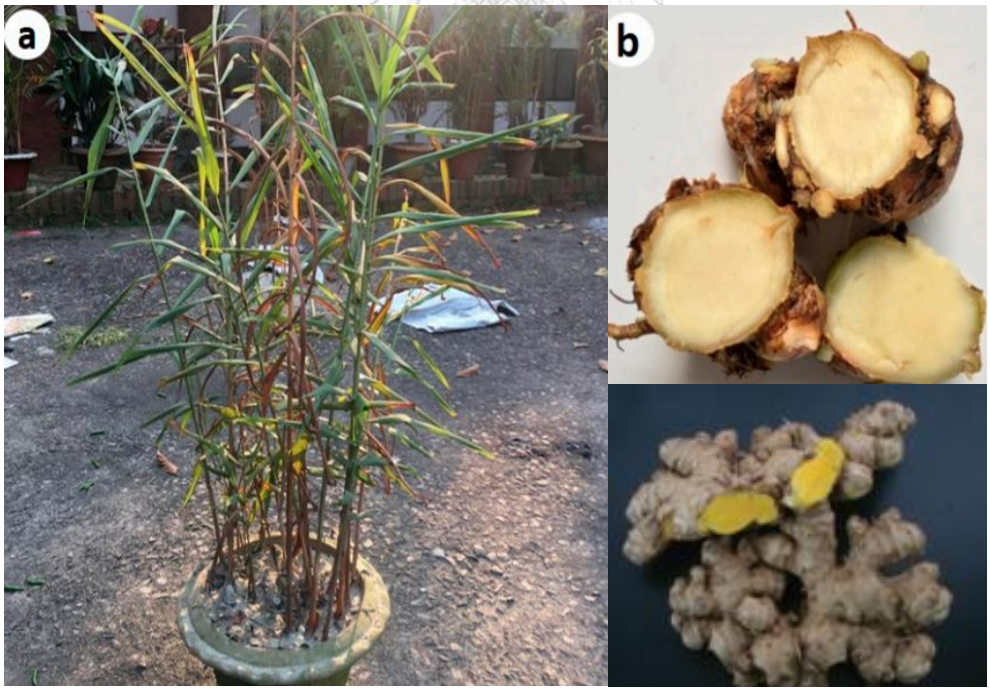
Table 66-3 Biological and pharmacological activities of *Zingiber montanum* Roxb.

Activities	Parts Used	Reference
Antimicrobial, insecticidal, anti-inflammatory, cytotoxic, anti-allergeni and antioxidant properties	Rhizome	[681]

Table 66-4 Toxicity assessment of *Zingiber montanum* Roxb.

Toxicity assessment	Parts used	Results	References
MTT assay: normal mouse embryo fibroblast cell (NIH/3T3).	Rhizome	Methanol extracts showed low toxicity at 100 ug/ml but higher toxicity at 200 ug/ml	[683]
MTT assay: normal cell lines (L929, murine fibroblast cell line) Vero (African green monkey kidney cell line)	Rhizome	Crude extract and purified compounds showed weak cytotoxicity activity with IC50 values of 1263.42 to 2857.83 µg/ml and 1537.83 to 2698.45 µg/ml against L929 and Vero cell lines.	[684]
Acute toxicity:	Rhizome	Hexane extracts:	[685]

Oral administration, Sprague-Dawley rats, single dose of 5000 mg/kg for 14 days. Chronic toxicity: Oral administration, Sprague-Dawley rats, daily at doses of 0.3-1,125 mg/kg for 270 days.		Acute toxicity: LD50 value is greater than 5000 mg/kg. Chronic toxicity: Did not produce clinical toxicity signs or death.	



(a): Whole plant (b): Rhizome (c): Fresh Rhizimes

Figure 75 of *Zingiber montanum* Roxb.[686]

Other crude drugs in remedies for Skin diseases

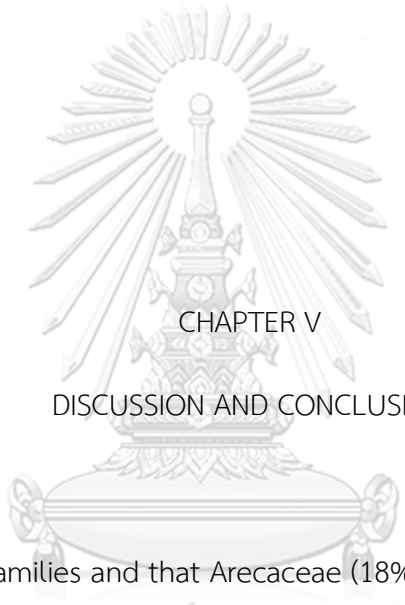
Other crude drugs are also found in Moh Phon's formularies for Skin diseases. They are used together with the medicinal plants. Table 8 shows the kinds of crude drugs in each symptom or diseases for Skin diseases.

Table 8 The other crude drugs in Moh Phon's traditional Thai medicine formulary for Skin diseases

Symptoms/ Diseases		Other Crude Drugs
	Herpes: Herpes zoster (shingles), Eczema (Eczema Herpeticum)	Cow stool (dry), Nautilus shell, Goose stool, Bone of rabbit, Old used net, Dirty water, Raining water, Ethyl alcohol, Limewater, Dirty water, ashes (wood), Red sulfur.
	Erysipelas (St. Anthony's fire)	Marl/ Limestone
	Medicines for the treatment of disease rashes	Water
	Medicine for eczema in children	Marl/ Limestone
	Rash due to various toxic/poison exposure	
	Rash due to mosquito and midges' bites	

	Antidote to poisonous animal bites	Ethyl alcohol, finger nail, lid of an earthen pot, Red lime.
	Rash	Salt, Red lime,
	Itchy disease	Water
	Urticaria (Hives)	Marl/ Limestone, Water, Ethyl alcohol.
	Urticaria and rashes	Water
	Ringworm, Tinea versicolor	Sulfur, Ethyl alcohol, Borax, Water, Raining water, Red ant, Salt
	Pityriasis versicolor or Tinea versicolor	Vinegar
	Pityriasis alba	Mother's milk
	Ringworm	Salt, Raining water,
	Impetigo, Ringworm	Copper (II) sulfate,
	Vitiligo	Salt, Shrimp paste, Fish sauce, Palm sugar
	Abscess/purulent	
	Scabies	Rice flour, Sulfur
	Warts	Urine, Soap, pH<7, Red lime
	Vaginal Itching	Water

	Scaly skin disease (Seborrheic dermatitis)	
	Tinea Cruris (jock itch)	
	Fresh wound	Honey, White sugar, Ethyl alcohol
	Fresh wound	
	Fresh wound and chronic wound	Pure lead
	Blister	Lid of an earthen pot, Water, Limewater, Potassium permanganate
	Tetanus (lockjaw)	Vinegar
	Cracked of palm and sole of feet	
	Sole of feet	Sulfur (yellow), Engine oil
	Rotting toe	Lid of an earthen pot, Water, Aluminum Sulphate (Alum)
	Athlete's foot	Sulfur, Kerosene



CHAPTER V

DISCUSSION AND CONCLUSION

There were totally 36 families and that Arecaceae (18%), Fabaceae/Leguminosae (14%), Alliaceae (12%), Solanaceae (11%), and Zingiberaceae (11%) belong to frequent botanical families in Moh Phon's traditional Thai medicine formulary for skin diseases and symptoms. According to some relative researches [687-690], many plants from these families have potential benefits to skin care. There are many examples, such as the therapeutic juice taken by the Assamese, which is ground from the seeds of witch hazel (Fabaceae) and mixed with heating oil of mustard (Brassicaceae) with Brassica juncea (Poaceae) and long turmeric (Zingiberaceae) to improve and treat the skin problems and diseases. [78]. Experimental studies have

shown that it can increase blood circulation on the skin surface and improve skin health And active ingredients for treating skin diseases [81]. Traditionally, cassia (Leguminosaeae) seeds and leaves can treat skin diseases. Its water extract also has anti-fungal, antimicrobial, antioxidant, and anti-nociceptive activities [82].

The most frequent medicinal plant species were *Cocos nucifera* L. (11%) and followed by *Citrus aurantifolia* Swingle (5%) and *Allium sativum* L. (4%), *Allium ascalonicum* L. (4%), *Cassia alata* (L.) Roxb (4%) with major pharmacological and biological activities included as antibacterial, anti-fungal, anti-inflammatory, and anti-oxidant. The main active constituents of the most frequent plant species *Cocos nucifera* L. are Lupeol-methylether, Catechin, Flavonoid , Saponin, a-tocopherol, tannins, Vitamin C, Liquid acid, L-arginine, etc.

Cocos nucifera L. (Coconut) oil was well known to helps with skin problems such as psoriasis, dermatitis, eczema, and other skin infections. Virgin coconut oil showed benefit for curing itching caused by eczema. Coconut oil is one of the best natural nutrients for hair and protect scalp from some insects such as lice and nits. Generally, it is very safe in use even for infants[691-693]. In addition, Antibacterial effect of coconut oil derivative monolaurin on children's skin diseases was significantly higher than or equivalent to that of commonly used antibiotics (penicillin, benzoxazole)[694]. *Citrus aurantifolia* Swing. (Lime) juice has been found to treat irritation and swelling caused by mosquito bites. the rind is burned off as mosquitoes repellents and peels to prevent acne and cure cuts [279]. *Allium*

sativum L. (Garlic) has been used successfully for various skin disorders [695, 696]. Allium ascalonicum L. (Shallot) has been traditionally used in Thailand to treat bacterial skin infections, tinea capitis, and hair loss [106]. *Cassia alata* (L.) Roxb (Candle bush) has been used as traditional medicine to treat various diseases, especially skin diseases [240].

According to Table 9, there are similarities in some countries for the plant or families with studying the remedies for skin conditions.

Table 9 The representative families and plant species used for skin conditions in some countries

Countries	Families	Plant species	Reference
Maya	Solanaceae, Malvaceae, Asparagaceae, Solanaceae	Pepper, cocoa, agave, tobacco.	[75]
China	Caesalpiniaceae, Polygonaceae	*Cassia Angustifolia,* rhubarb, Coptis.	[76]
Ethiopia	Verbenaceae, Oliniaceae	Lippiaadoensis, Oliniarochetiana	[77]
India	Apocynaceae, Fabaceae, Apiaceae/Umbelliferae, Solanaceae, Asteraceae, Caryophyllaceae,	*Calotropis gigantic*, *Cannabaceae*, *Cassia alata*, *Centella Asiatica, Datura Metal*, Jatropha., *Litsea cubeba*, *Mimosa pudica*,	[79]

	Euphorbiaceae, Lauraceae, Apocynaceae	*Plantaginaceae*, and *Acutifolia*	
Portugal	Asteraceae	*Arctium minus* and *Calendula officinalis*	[80]

The most preferable method of remedies preparation was pound (38%), follow by mixed (14%), decoction (11%), rasp (7%) and crush (6%). The preparation methods like pound, mix, rasp, crumble, squeeze and cut used raw materials which many studies showed that raw materials was a standard method of preparing herbal recipes often indicated by traditional healers because of simple, fast, don't need any complicate equipment or any solvent [699]. Also, the decoction preparation method is the most recommended way of administration. According to many other authors [700].

The leaf and fruit were the most frequently used in recipes against skin conditions. Leaf and fruit used were similar to many recent studies on traditional healers' most commonly used plant parts [701, 702]. Administration of the remedies was mostly topical on the affected area. The most common method was apply topical (72%), follow by poultice (17%) and shower (5%).

Additionally, most of the medicinal plants mentioned in Moh Phon's traditional Thai medicine formulary for skin diseases/ conditions have shown many biological and pharmacological properties such as antiviral, antibacterial, antifungal, anti-oxidant

and anti-inflamatory etc. These various different biological and pharmacological properties of medicinal plants can validate the efficacy of poly-herbal usage to relieve a variety of symptoms associated with skin diseases/ conditions.

According to the national health policy to promote the use of herbal medicines in health system in Thailand, therefore some herbal medicines are inside the National list of Essential medicine (NLEM; is a list of medications used in the hospitals and public health services in Thailand) such as herbal medicine for treatment of skin symptoms which has seven kinds of herbal medicines including *Rhinacanthus nasutus* (L.) kurz, *Piper betle* L., *Centella asiatica* (L.) Urb., *Garcinia mangostana* L., *Clinacanthus nutans* (Burm. f.) lindau, *Aloe vera* (L.) Burm. f. and *Annona squamosa* Linn. as shown in Table 10. Five of them were also mentioned in Moh Phon's Thai traditional medicine formulary for skin diseases and conditions, namely 1. *Rhinacanthus nasutus* for treatment of Tenea circinato or ring worm 2. *Piper betle* for urticaria 3. *Centella asiatica* for rash and fresh wound 4. *Garcinia mangostana* for blister and rotting toe 5. *Clinacanthus nutans* for herpes simplex and herpes zoster. This means that these five medicinal plants were accept and approved for treatment of skin diseases/ conditions and promoting to used in health system in Thailand.

Table 10 Herbal medicines for treatment of skin symptoms in NLEM of Thailand

Herbal medicine	Plant element	Skin disease/ condition
1.Ya-Tincture-Thong-Phan-Chang	*Rhinacanthus nasutus* (L.) kurz	Ring worm, Fungal infection, Athlete's foot

(ยาทิงเจอร์ทองพันชั่ง)		
2. Ya-Tincture-Plu (ยาทิงเจอร์พลู)	*Piper betle* L.	Dermatitis
3. Ya-Bau-Bok (ยาบัวบก) (made from Gotu kola)	*Centella asiatica* (L.) Urb.	Fresh wound
4. Ya-Pluek-Muang-Khud (ยาเปลือกมังคุด) (made from mangosteen peel)	*Garcinia mangostana* L.	Fresh and chronic wound
5. Ya-Pha-Ya-Yor (ยาพญายอ)	*Clinacanthus nutans* (Burm. f.) lindau	Herpes simplex and Herpes zoster
6. Ya-Van-Hang-Jor-Ra-Khae (ยาว่านหางจระเข้) (made from Aloe)	*Aloe vera* (L.) Burm. f.	Burn
7. Ya-Ma-Led-Noi-Na (ยาเมล็ดน้อยหน่า) (made from custard seeds)	*Annona squamosa* Linn.	Pediculosis (Lice)

The recipes in TTM were made up of the form as plants and non-plants, non-plants only, and plants only. In some cases, non-plant elements such as mineral compounds (water, alum or salt, sulfur, etc.) were added to plant organs in the

composition of recipes. There are similar cases in other countries from using traditional medicine. The role of non-herbal medicines in ancient remedies also has scientific evidence here. for example. In previous studies, the main findings were the use of alum as a hemostatic agent (to control bleeding), the use of jarosite for osteoarthritis, the choice of black potash for eczema, to repel insects, and as an antibacterial agent. As active ingredient in laxatives, homeostatic agents and mineral supplements, as well as sulfur has keratolytic and antibacterial properties [697, 698]..

Conclusion

This study is the first report on the idenfication of medicinal plants used in Moh Phon's traditional Thai medicine formularies for skin diseases/ conditions. These plants were used to treat 26 skin diseases/ conditions with seventy-nine remedies. These medicines were prepared as pound, decoction, stew, burn, fried, taken in the form of poultice, rub, shower, eat, and drink. Preparation methods are mostly pound and administration methods commonly are apply topical. Sixty-six plants species were identified, divided into 54 of dicotyledon (31 families), 12 of monocotyledon (8 families). The frequent families were Arecaceae (18%), Fabaceae/Leguminosae (14%), Alliaceae (12%), Solanaceae (11%), and Zingiberaceae (11%). Frequent species were *Cocos nucifera* L. (11%) and followed by *Citrus aurantifolia* Swingle (5%), *Allium sativum* L. (4%), *Allium ascalonicum* L. (4%), and *Cassia alata* (L.) Roxb (4%).

In this study, a systematic review of various databases was used in order to find the scientific evidence on biological and pharmacological activities and also toxicological studies of the 66 medicinal plants in these recipes. Therefore, this study can provides scientific information on plant species used in Moh Phon's Thai traditional medicine formularies for skin conditions including scientific name, local name, plant description, traditional use, parts used, methods of preparation, biological and pharmacological activities and toxicological studies. This data can support the conservation of traditional knowledge and will facilitate future modern herbal drug developments research.

REFERENCES

1. Khan, M.S.A. and I. Ahmad, *Herbal medicine: current trends and future prospects*, in *New Look to phytomedicine*. 2019, Elsevier. p. 3-13.

2. Kennedy, D.A., et al., *Herbal medicine use in pregnancy: results of a multinational study.* BMC complementary and alternative medicine, 2013. 13(1): p. 1-10.

3. Bahekar, S. and R. Kale, *Herbal plants used for the treatment of malaria-A literature review.* Journal of pharmacognosy and Phytochemistry, 2013. 1(6).

4. Glover, D.D., et al., *Prescription, over-the-counter, and herbal medicine use in a rural, obstetric population.* American Journal of Obstetrics & Gynecology, 2003. 188(4): p. 1039-1045.

5. Sen, S. and R. Chakraborty, *Revival, modernization and integration of Indian traditional herbal medicine in clinical practice: Importance, challenges and future.* J Tradit Complement Med, 2017. 7(2): p. 234-244.

6. Charoonratana, T., et al., *Quantitative analysis and formulation development of a traditional Thai antihypertensive herbal recipe.* Phytochemistry Reviews, 2014. 13(2): p. 511-524.

7. Welz, A.N., A. Emberger-Klein, and K. Menrad, *Why people use herbal medicine: insights from a focus-group study in Germany.* BMC complementary and alternative medicine, 2018. 18(1): p. 1-9.

8. van Galen, E., *Traditional herbal medicines worldwide, from reappraisal to assessment in Europe.* Journal of Ethnopharmacology, 2014. 158: p. 498-502.

9. Adhikari, P.P. and S.B. Paul, *History of Indian traditional medicine: A medical inheritance.* HISTORY, 2018. 11(1).

10. Leonti, M. and R. Verpoorte, *Traditional Mediterranean and European herbal medicines.* J Ethnopharmacol, 2017. 199: p. 161-167.

11. Jamshidi-Kia, F., Z. Lorigooini, and H. Amini-Khoei, *Medicinal plants: Past history and future perspective.* Journal of herbmed pharmacology, 2018. 7(1).

12. Dev, S., *Ancient-modern concordance in Ayurvedic plants: some examples.* Environmental Health Perspectives, 1999. 107(10): p. 783-789.

13. Malik, K., et al., *An ethnobotanical study of medicinal plants used to treat skin diseases in northern Pakistan.* BMC Complementary and Alternative Medicine, 2019. 19(1): p. 210.

14. KANGWANSURAKRAI, K. and D. Kraipakron, *HISTORIOGRAPHY ON ADMIRAL PRINCE ABHAKARA KIARTIVONGSE (1923-1993)*. 2020, Srinakharinwirot University.

15. Musgrave, T., *The Multifarious Mr. Banks*, in *CHAPTER 6 The Royal Botanic Gardens, Kew*. 2020, Yale University Press. p. 176-223.

16. Wang, H.R., et al., *A systematic review and meta‐analysis of randomized controlled trials: Skin‐patch of Chinese herbal medicine for patients with acute gouty arthritis.* Journal of advanced nursing, 2018. 74(8): p. 1769-1786.

17. Kawai, T., et al., *What students learned from "Thai medicine seminar": Implication for education in medical communication.* Cogent Education, 2019. 6(1): p. 1674588.

18. Mogkaew, P., *Construction of Dhammanamai Principles in Treatment of Thai Traditional Medicine of Prongmadaue Community, Muang District, Nakhonpathom Province.* วารสาร สห วิทยาการ มนุษยศาสตร์ และ สังคมศาสตร์, 2019. 2(3): p. 45-54.

19. AC03072220, A., *Science across cultures: the history of non-Western science*. 2000: Springer.

20. Lawton, S., *Skin 1: The structure and functions of the skin.* Nurs. Times, 2019. 115: p. 30-33.

21. Chong, S.Z., M. Evrard, and L.G. Ng, *Lights, Camera, and Action: Vertebrate Skin Sets the Stage for Immune Cell Interaction with Arthropod-Vectored Pathogens.* Frontiers in immunology, 2013. 4: p. 286.

22. Chamnan, P., et al., *Burden of Skin Diseases in Thailand: Analysis of Prevalence and DALYs Using Real-world Healthcare Service Data.* 2020.

23. Hay, R.J., et al., *The Global Burden of Skin Disease in 2010: An Analysis of the Prevalence and Impact of Skin Conditions.* Journal of Investigative Dermatology, 2014. 134(6): p. 1527-1534.

24. Furue, K., T. Ito, and M. Furue, *Differential efficacy of biologic treatments targeting the TNF-α/IL-23/IL-17 axis in psoriasis and psoriatic arthritis.* Cytokine, 2018. 111: p. 182-188.

25. Ramadan, M., et al., *Skin microbiome differences in atopic dermatitis and healthy controls in Egyptian children and adults, and association with serum immunoglobulin E.* Omics: a journal of integrative biology, 2019. 23(5): p. 247-260.

26. Ishiuji, Y., et al., *Exacerbation of atopic dermatitis symptoms by ustekinumab in psoriatic patients with elevated serum immunoglobulin E levels: Report of two cases.* The Journal of dermatology, 2018. 45(6): p. 732-734.

27. Manousaki, D., et al., *Vitamin D levels and susceptibility to asthma, elevated immunoglobulin E levels, and atopic dermatitis: A Mendelian randomization study.* PLoS medicine, 2017. 14(5): p. e1002294.

28. Khasawneh, A.R., *Constitutional and psychological features of seborrheic dermatitis (analysis of scientific literature).* Reports of Vinnytsia National Medical University, 2019. 23(4): p. 740-744.

29. Linder, D., et al., *Seborrheic dermatitis and hypertension in adults: a cross-sectional study.* Journal of the European Academy of Dermatology and Venereology, 2014. 28(11): p. 1450-1455.

30. Del Prete, S., et al., *Cloning, purification, and characterization of a β-carbonic anhydrase from Malassezia restricta, an opportunistic pathogen involved in dandruff and seborrheic dermatitis.* International journal of molecular sciences, 2019. 20(10): p. 2447.

31. Dhar, S. and S.M. Srinivas, *Eczema and Dermatitis.* IADVL's Concise Textbook of Dermatology, 2019: p. 230.

32. Kaushik, M., S. Gupta, and A. Mahendra, *Living with acne: Belief and perception in a sample of Indian youths.* Indian journal of dermatology, 2017. 62(5): p. 491.

33. Andersson, T., et al., *Common skin bacteria protect their host from oxidative stress through secreted antioxidant RoxP.* Scientific reports, 2019. 9(1): p. 1-10.

34. van Geel, N., et al., *Meeting report: Vitiligo Global Issues Consensus Conference Workshop'Outcome measurement instruments' and Vitiligo International Symposium, Rome, Nov 30-Dec 3rd.* Pigment cell & melanoma research, 2017. 30(4): p. 436-443.

35. Youssefi, M.R. and M.T. Rahimi, *cat flea.* Asian Pac J Trop Biomed, 2014. 4(4): p. 334-6.

36. Dighe, N., et al., *Fifth disease.* Virology, 2009. 19: p. 8.

37. Powell, F.C., *Rosacea.* New England Journal of Medicine, 2005. 352(8): p. 793-803.

38. Cole, C. and J. Gazewood, *impetigo.* Am Fam Physician, 2007. 75(6): p. 859-64.

39. Degreef, H., *ringworm* Mycopathologia, 2008. 166(5-6): p. 257.

40. Garner, L.A., *Contact dermatitis.* Dermatologic therapy, 2004. 17(4): p. 321-327.

41. Breuer, K., et al., *allergic eczema.* Allergy, 2004. 59(9): p. 988-994.

42. Ventarola, D., L. Bordone, and N. Silverberg, *hand-foot-and-mouth disease.* Clinics in Dermatology, 2015. 33(3): p. 340-346.

43. Concannon, P., et al., *Diaper dermatitis.* Pediatric dermatology, 2001. 18(2): p. 149-155.

44. Proksch, E., R. Fölster-Holst, and J.-M. Jensen, *eczema.* Journal of Dermatological Science, 2006. 43(3): p. 159-169.

45. Christophers, E., *Psoriasis.* Clinical and experimental dermatology, 2001. 26(4): p. 314-320.

46. Yell, J., J. Mbuagbaw, and S. Burge, *(pic) systemic lupus erythematosus.* British journal of dermatology, 1996. 135(3): p. 355-362.

47. Sampathkumar, P., L.A. Drage, and D.P. Martin, *Herpes Zoster (Shingles) and Postherpetic Neuralgia.* Mayo Clinic Proceedings, 2009. 84(3): p. 274-280.

48. Wells, G. and N.P. Smith, *Eosinophilic cellulitis.* British Journal of Dermatology, 1979. 100(1): p. 101-109.

49. Ardern‐Jones, M.R. and P.S. Friedmann, *drug allergy.* British journal of clinical pharmacology, 2011. 71(5): p. 672-683.

50. Hengge, U.R., et al., *Scabies.* The Lancet infectious diseases, 2006. 6(12): p. 769-779.

51. Suringa, D.W., L.J. Bank, and A.B. Ackerman, *measles.* New England Journal of Medicine, 1970. 283(21): p. 1139-1142.

52. Stanek, G. and F. Strle, *tick bite.* FEMS microbiology reviews, 2018. 42(3): p. 233-258.

53. McGinley, T., K. Cornejo, and P. Lambert, *Seborrheic (eczema) Dermatitis*, in *Common Dermatologic Conditions in Primary Care*. 2019, Springer. p. 87-97.

54. Johnson, N. and J. Dill, *Scarlet Fever*, in *Life-Threatening Rashes*. 2018, Springer. p. 117-125.

55. Hedrich, C.M., A. Schnabel, and T. Hospach, *Kawasaki disease.* Frontiers in pediatrics, 2018. 6: p. 198.

56. Boothe, W.D., J.A. Tarbox, and M.B. Tarbox, *Atopic dermatitis.* Management of Atopic Dermatitis, 2017: p. 21-37.

57. Agner, T. and P. Elsner, *eczema.* Journal of the European Academy of Dermatology and Venereology, 2020. 34: p. 4-12.

58. Chang, W.-J., et al., *dandruff.* IEEE Access, 2020. 8: p. 134826-134837.

59. Taylor, S.C., et al., *Acne* Journal of the American Academy of Dermatology, 2002. 46(2, Supplement 2): p. S98-S106.

60. Raff, A.B. and D. Kroshinsky, *Cellulitis.* JAMA, 2016. 316(3): p. 325-337.

61. Fitch, M.T., et al., *Skin Abscess* N Engl J Med, 2007. 357(19): p. e20.

62. Orth, G., M. Favre, and O. Croissant, *warts.* Journal of virology, 1977. 24(1): p. 108-120.

63. Mhaske, H. and D. Phalke. *Melanoma skin cancer* in *2013 International conference on Circuits, Controls and Communications (CCUBE)*. 2013. IEEE.

64. Dourmishev, L.A., D. Rusinova, and I. Botev, *basal cell carcinoma.* Indian dermatology online journal, 2013. 4(1): p. 12.

65. Damour, A., et al., *Eczema herpeticum: clinical and pathophysiological aspects.* Clinical reviews in allergy & immunology, 2019: p. 1-18.

66. Dianzani, C., et al., *actinic keratosis.* International journal of dermatology, 2020. 59(6): p. 677-684.

67. Johnson, T.M., et al., *Squamous cell carcinoma.* Journal of the American Academy of Dermatology, 1992. 26(3): p. 467-484.

68. Chayavichitsilp, P., et al., *Herpes simplex.* Pediatrics in Review, 2009. 30(4): p. 119.

69. Kim, J.E., et al., *hives (cholinergic urticaria).* Annals of dermatology, 2014. 26(2): p. 189.

70. Savin, R., *tinea versicolor.* Journal of family practice, 1996. 43(2): p. 127-139.

71. Biesbroeck, L. and R. Sidbury, *Viral exanthems.* Dermatologic therapy, 2013. 26(6): p. 433-438.

72. scabra Bunge, G., *Shingles.*

73. Srinivasan, D., et al., *Antimicrobial activity of certain Indian medicinal plants used in folkloric medicine.* Journal of Ethnopharmacology, 2001. 74(3): p. 217-220.

74. Pan, S.-Y., et al., *Historical Perspective of Traditional Indigenous Medical Practices: The Current Renaissance and Conservation of Herbal Resources.* Evidence-Based Complementary and Alternative Medicine, 2014. 2014: p. 525340.

75. Duke, J.A., *Duke's handbook of medicinal plants of Latin America*. 2008: CRC press.

76. Cuéllar, M.J., et al., *Topical anti-inflammatory activity of some Asian medicinal plants used in dermatological disorders.* Fitoterapia, 2001. 72(3): p. 221-229.

77. Solanki, R., *Treatment of skin diseases through medicinal plants in different regions of the world.* Int J Biomed Res, 2011. 2(1): p. 73.

78. Saikia, A.P., et al., *Ethnobotany of medicinal plants used by Assamese people for various skin ailments and cosmetics.* Journal of Ethnopharmacology, 2006. 106(2): p. 149-157.

79. Begum, D. and S.C. Nath, *Ethnobotanical Review of Medicinal Plants Used for Skin Diseases and Related Problems in Northeastern India.* Journal of Herbs, Spices & Medicinal Plants, 2000. 7(3): p. 55-93.

80. Parsaeimehr, A., S.O. Martinez-Chapa, and R. Parra-Saldívar, *Chapter 13 - Medicinal Plants Versus Skin Disorders: A Survey From Ancient to Modern Herbalism*, in *The Microbiology of Skin, Soft Tissue, Bone and Joint Infections*, K. Kon and M. Rai, Editors. 2017, Academic Press. p. 205-221.

81. Lee, D.-H., et al., *The efficacy and safety of a proposed herbal moisturising cream for dry skin and itch relief: a randomised, double-blind, placebo-controlled trial-study protocol.* BMC complementary and alternative medicine, 2013. 13(1): p. 1-7.

82. Ahshawat, M., S. Saraf, and S. Saraf, *Preparation and characterization of herbal creams for improvement of skin viscoelastic properties.* International journal of cosmetic science, 2008. 30(3): p. 183-193.

83. Whitley, R.J. and B. Roizman, *Herpes simplex virus infections.* The Lancet, 2001. 357(9267): p. 1513-1518.

84. Damour, A., et al., *Eczema herpeticum: clinical and pathophysiological aspects.* Clinical reviews in allergy & immunology, 2020. 59(1): p. 1-18.

85. Bratton, R.L. and R.E. Nesse, *St. Anthony's Fire: diagnosis and management of erysipelas.* American Family Physician, 1995. 51(2): p. 401-404.

86. Degreef, H., *Clinical forms of dermatophytosis (ringworm infection).* Mycopathologia, 2008. 166(5): p. 257-265.

87. Burke, R.C., *Tinea versicolor: susceptibility factors and experimental infection in human beings.* Journal of investigative dermatology, 1961. 36(5): p. 389-401.

88. Miazek, N., et al., *Pityriasis Alba—Common Disease, Enigmatic Entity: Up-to-Date Review of the Literature.* Pediatric Dermatology, 2015. 32(6): p. 786-791.

89. Pippin, M.M. and M.L. Madden, *Tinea cruris*, in *StatPearls [Internet]*. 2022, StatPearls Publishing.

90. Schissel, D., J. Aydelotte, and R. Keller, *Road rash with a rotten odor.* Military medicine, 1999. 164(1): p. 65-67.

91. Ongsri, P., et al., *Prevalence and clinical correlation of superficial fungal foot infection in Thai naval rating cadets.* Military Medicine, 2018. 183(9-10): p. e633-e637.

92. Shalal, O.S., Q.A. Rasheed, and D.A. Alkurjiya, *A molecular Study of the Microsporum Canis and Trichophyton Mentagrophytes Associated Fungal Infection: Athlete's Foot among Farmers.* Indian Journal of Forensic Medicine & Toxicology, 2022. 16(1): p. 941.

93. *PHYTOCHEMICAL AND ANTIBACTERIAL POTENTIAL OF ACETONE LEAF EXTRACT OF ACACIA CONCINNA (WILLD.) DC.*

94. Aung, S. and M.M. Moe, *Phytochemical and Antioxidant Activity of Acacia concinna (Willd.) DC. Fruits.*

95. Meena, R. and N. Chouhan, *"Green Synthesis of Silver Nanoparticles using Acacia Concinna plant extract and their Antibacterial activity".* 2018.

96. Boonmee, S. and H. Kato-Noguchi, *Allelopathic activity of Acacia concinna pod extracts.* Emirates Journal of Food and Agriculture, 2017: p. 250-255.

97. Ruangaram, W. and E. Kato, *Selection of Thai medicinal plants with anti-obesogenic potential via in vitro methods.* Pharmaceuticals, 2020. 13(4): p. 56.

98. Sulthana, S.S., *Evaluation aqueous bark and pods extracts of Antiulcer activity of Acacia concinna.* 2019.

99. Brink, M. and R. Escobin, *Plant resources of South-East Asia*. 2003: Backhuys Publ.

100. Ade-Ajayi, A., et al., *Preliminary phytochemical and antimicrobial screening of Agave sisalana Perrine juice (waste).* Journal of Environmental Chemistry and Ecotoxicology, 2011. 3(7): p. 180-183.

101. *EXTRACTION AND CHARACTERIZATION OF SAPOGENINCHEMICAL FROM AGAVE SISALANA LEAVES AND SEPARATION OF HECOGENIN FOR PHARMACEUTICAL PRODUCT STARTING MATERIALS.*

102. PJ, M. and M. SA, *Assessment of the potential toxic effects of Agave sisalana Perrine ex Engelm in rats.* Journal of Medicinal Plants Research, 2013. 7(34): p. 2518-2526.

103. Dunder, R.J., et al., *Applications of the hexanic fraction of Agave sisalana Perrine ex Engelm (Asparagaceae): control of inflammation and pain screening.* Memórias do Instituto Oswaldo Cruz, 2013. 108: p. 263-271.

104. Setliff, G. and J. Anderson, *First record of the agave snout weevil, Scyphophorus acupunctatus Gyllenhal (Coleoptera: Curculionidae: Dryophthorinae), in Puerto Rico.* Insecta Mundi, 2011. 152: p. 1–3.

105. *Allium ascalonicum L. -an Ayurvedic perspective.*

106. Ruksiriwanich, W., et al., *Phytochemical Constitution, Anti-Inflammation, Anti-Androgen, and Hair Growth-Promoting Potential of Shallot (Allium ascalonicum L.) Extract.* Plants, 2022. 11(11): p. 1499.

107. Fattorusso, E., et al., *Chemical composition of shallot (Allium ascalonicum Hort.).* J Agric Food Chem, 2002. 50(20): p. 5686-90.

108. Seyfi, P., et al., *In vitro and in vivo anti-angiogenesis effect of shallot (Allium ascalonicum): a heat-stable and flavonoid-rich fraction of shallot extract potently inhibits angiogenesis.* Toxicol In Vitro, 2010. 24(6): p. 1655-61.

109. Mai, N.T., et al., *Triterpenoid glycosides from the rhizomes of Allium ascalonicum and their anoctamin-1 inhibitory activity.* Nat Prod Res, 2020: p. 1-9.

110. Mohammadi-Motlagh, H.R., A. Mostafaie, and K. Mansouri, *Anticancer and anti-inflammatory activities of shallot (Allium ascalonicum) extract.* Arch Med Sci, 2011. 7(1): p. 38-44.

111. Adeniyi, B.A. and F.M. Anyiam, *In vitro anti-Helicobacter pylori potential of methanol extract of Allium ascalonicum Linn. (Liliaceae) leaf: susceptibility and effect on urease activity.* Phytother Res, 2004. 18(5): p. 358-61.

112. Amin, M. and B.P. Kapadnis, *Heat stable antimicrobial activity of Allium ascalonicum against bacteria and fungi.* Indian J Exp Biol, 2005. 43(8): p. 751-4.

113. Saenthaweesuk, S., et al., *An investigation of antimicrobial and wound healing potential of Allium ascalonicum Linn.* J Med Assoc Thai, 2015. 98 Suppl 2: p. S22-7.

114. Jalal, R., et al., *Hypoglycemic effect of aqueous shallot and garlic extracts in rats with fructose-induced insulin resistance.* J Clin Biochem Nutr, 2007. 41(3): p. 218-23.

115. Trakranrungsie, N., A. Chatchawanchonteera, and W. Khunkitti, *Ethnoveterinary study for antidermatophytic activity of Piper betle, Alpinia galanga and Allium ascalonicum extracts in vitro.* Res Vet Sci, 2008. 84(1): p. 80-4.

116. Arpornchayanon, W., et al., *Antiallergic activities of shallot (Allium ascalonicum L.) and its therapeutic effects in allergic rhinitis.* Asian Pac J Allergy Immunol, 2019.

117. Kang, L.P., et al., *New furostanol saponins from Allium ascalonicum L.* Magn Reson Chem, 2007. 45(9): p. 725-33.

118. Sadeghi Dinani, M. and N. Zakeri Tehrani, *Bioassay guided fractionation of Allium austroiranicum by cytotoxic effects against ovary and cervical cancer cell lines.* Research Journal of Pharmacognosy, 2020. 7(1): p. 1-6.

119. Pandurangan, V., S.S.D. Amanulla, and K. Ramanathan, *Anticancer efficacy of dry and fresh Allium ascalonicum (shallot) against HepG2 cell line.* Natl J Physiol Pharm Pharmacol, 2016. 6(3): p. 196-199.

120. Ounjaijean, S. and V. Somsak, *Preliminary Study on Hepatoprotective Activity of Aqueous Crude Extract of Allium ascalonicum against Ethanol-induced Liver Injury in Mice.* Walailak Journal of Science and Technology (WJST), 2020. 17(10): p. 1088-1094.

121. Minh, N.P., *Technical Factors affecting to pickle shallot (allium ascalonicum) fermentation.* Journal of Pharmaceutical Sciences and Research, 2019. 11(3): p. 879-881.

122. Lawal, B., et al., *Antimicrobial evaluation, acute and sub-acute toxicity studies of Allium sativum.* Journal of Acute Disease, 2016. 5(4): p. 296-301.

123. Krstin, S., et al., *Anti-Parasitic Activities of Allium sativum and Allium cepa against Trypanosoma b. brucei and Leishmania tarentolae.* Medicines (Basel), 2018. 5(2).

124. Baek, S.C., et al., *Anti-adipogenic Effect of beta-Carboline Alkaloids from Garlic (Allium sativum).* Foods, 2019. 8(12).

125. Bahmani, M., et al., *Allium sativum L.: the anti-immature leech (Limnatis nilotica) activity compared to Niclosomide.* Comp Clin Path, 2013. 22(2): p. 165-168.

126. Priya, T., *A review on therapeutic use of essential oils from traditional herbal plants.* 2018.

127. *Morphological characteristics of garlic (Allium sativum L.)genetic resources collection – Information.*

128. Bhatwalkar, S.B., et al., *Anti-biofilm and Antibacterial Activity of Allium sativum Against Drug Resistant Shiga-Toxin Producing Escherichia coli (STEC) Isolates from Patient Samples and Food Sources.* Indian J Microbiol, 2019. 59(2): p. 171-179.

129. Block, E., et al., *Fluorinated Analog NMR s of Organosulfur Compounds from Garlic (Allium sativum): Synthesis, Chemistry and Anti-Angiogenesis and Antithrombotic Studies.* Molecules, 2017. 22(12).

130. Chung, K.S., et al., *Anti-Proliferation Effects of Garlic (Allium sativum L.) on the Progression of Benign Prostatic Hyperplasia.* Phytother Res, 2016. 30(7): p. 1197-203.

131. Waghulde, S., et al., *Cumulative Effect of the Aqueous and Ethanolic Extracts of Annona Reticulate and Allium Sativumon Brine Shrimp Lethality Assay.* Multidisciplinary Digital Publishing Institute Proceedings, 2019. 41(1): p. 36.

132. Jasamai, M., et al., *Effect of Allium sativum (garlic) methanol extract on viability and apoptosis of human leukemic cell lines.* Tropical Journal of Pharmaceutical Research, 2016. 15(7): p. 1479-1485.

133. Tungmunnithum, D., et al., *Flavonoids Profile, Taxonomic Data, History of Cosmetic Uses, Anti-Oxidant and Anti-Aging Potential of Alpinia galanga (L.) Willd.* Cosmetics, 2020. 7(4): p. 89.

134. Chouni, A. and S. Paul, *A review on phytochemical and pharmacological potential of Alpinia galanga.* Pharmacognosy Journal, 2018. 10(1).

135. Shukla, D., T. Jawaid, and S. Srivastava, *Alpinia galanga: an overview and herbal interactions.* Medico Research Chronicles, 2017. 4(03): p. 301-305.

136. Pengsook, A., et al., *Insecticidal activity of isolated phenylpropanoids from Alpinia galanga rhizomes against Spodoptera litura.* Natural product research, 2020: p. 1-5.

137. Muniandy, P., et al., *A study of antibacterial efficacy of Alpinia galangal extracts against Staphylococcus aureus, Staphylococcus epidermidis and Listeria monocytogenes.* Journal of Pharmaceutical Sciences and Research, 2019. 11(8): p. 3061-3066.

138. Ahlina, F.N., et al., *Revealing the reversal effect of galangal (Alpinia galanga L.) extract against oxidative stress in metastatic breast cancer cells and normal fibroblast cells intended as a co-chemotherapeutic and anti-ageing agent.* Asian Pacific Journal of Cancer Prevention, 2020. 21(1): p. 107-117.

139. Qureshi, S., A. Shah, and A. Ageel, *Toxicity studies on Alpinia galanga and Curcuma longa.* Planta medica, 1992. 58(02): p. 124-127.

140. Khairullah, A.R., et al., *A Review of an Important Medicinal Plant: Alpinia galanga (L.) Willd.* Systematic Reviews in Pharmacy, 2020. 11(10): p. 387-395.

141. Suttiarporn, P., et al., *Process Optimization of Microwave Assisted Simultaneous Distillation and Extraction from Siam cardamom using Response Surface Methodology.* Processes, 2020. 8(4): p. 449.

142. Taechowisan, T., et al., *Cytotoxicity and antibacterial activities of crude extract of Streptomyces sp. W08, an endophyte of Amomum krervanh Pierre.* Journal of Applied Pharmaceutical Science, 2021. 11(08): p. 134-138.

143. Aung, H.T., et al., *A review of traditional medicinal plants from Kachin State, Northern Myanmar.* Natural Product Communications, 2016. 11(3): p. 1934578X1601100310.

144. Kamchonwongpaisan, S., et al., *An antimalarial peroxide from Amomum krervanh Pierre.* Tetrahedron letters, 1995. 36(11): p. 1821-1824.

145. Schwikkard, S. and F.R. van Heerden, *Antimalarial activity of plant metabolites.* Natural Product Reports, 2002. 19(6): p. 675-692.

146. Diao, W.-R., et al., *Chemical composition, antibacterial activity, and mechanism of action of the essential oil from Amomum kravanh.* Journal of Food Protection, 2014. 77(10): p. 1740-1746.

147. Luo, J.-G., H. Yin, and L.-Y. Kong, *Monoterpenes from the fruits of Amomum kravanh.* Journal of Asian natural products research, 2014. 16(5): p. 471-475.

148. Pitasawat, B., et al., *Screening for larvicidal activity of ten carminative plants.* Southeast Asian J Trop Med Public Health, 1998. 29(3): p. 660-662.

149. Chaimanee, V., et al., *Antimicrobial activity of plant extracts against the honeybee pathogens, Paenibacillus larvae and Ascosphaera apis and their topical toxicity to Apis mellifera adults.* Journal of applied microbiology, 2017. 123(5): p. 1160-1167.

150. Dechayont, B., et al., *Anti-Helicobacter pylori, anti-inflammatory and antioxidant evaluation of crude extracts from Amomum krervanh fruits.* ScienceAsia, 2019. 45(2): p. 109-115.

151. Wannakrairoj, S. and W. Tefera, *Thidiazuron and other plant bioregulators for axenic culture of Siam cardamom (Amomum krervanh Pierre ex Gagnep.).* Kasetsart Journal - Natural Science, 2012. 46: p. 335-345.

152. Khalil, A., et al., *Value Added Products, Chemical Constituents and Medicinal Uses of Celery (Apium graveolens L.) -A Review.* 2015: p. 40-48.

153. Al Aboody, M.S., *Cytotoxic, antioxidant, and antimicrobial activities of Celery (Apium graveolens L.).* Bioinformation, 2021. 17(1): p. 147-156.

154. Ramezani, M., S. Nasri, and N. Yassa, *Antinociceptive and anti-inflammatory effects of isolated fractions from Apium graveolens seeds in mice.* Pharmaceutical biology, 2009. 47(8): p. 740-743.

155. Dąbrowska, J.A., A. Kunicka-Styczyńska, and K.B. Śmigielski, *Biological, chemical, and aroma profiles of essential oil from waste celery seeds (Apium graveolens L.).* Journal of Essential Oil Research, 2020. 32(4): p. 308-315.

156. Krishnaraju, A.V., et al., *Assessment of bioactivity of Indian medicinal plants using brine shrimp (Artemia salina) lethality assay.* International Journal of Applied Science and Engineering, 2005. 3(2): p. 125-134.

157. Al-Howiriny, T., et al., *Gastric antiulcer, antisecretory and cytoprotective properties of celery (Apium graveolens) in rats.* Pharmaceutical biology, 2010. 48(7): p. 786-793.

158. Kooti, W. and N. Daraei, *A review of the antioxidant activity of celery (Apium graveolens L).* Journal of evidence-based complementary & alternative medicine, 2017. 22(4): p. 1029-1034.

159. Al-Moubaraki, A., et al., *Role of Aqueous Extract of Celery (Apium graveolens L.) Seeds against the Corrosion of Aluminium/Sodium Hydroxide Systems.* Journal of Environmental Chemical Engineering, 2017. 5.

160. Jaiswal, P., et al., *Areca catechu L.: A valuable herbal medicine against different health problems.* Res J Med Plant, 2011. 5(2): p. 145-52.

161. Bhat, S.K., M. Sarpangala, and D. Ashwin, *Antilipidemic activity of arecanut, Areca catechu L.: A valuable herbal medicine.* International Journal of Herbal Medicine, 2017. 5(1): p. 35-38.

162. Khan, M.S. and M.S. Akhter, *Antibacterial and cytotoxic activities of Areca catechu L.(betel nut).* 2020.

163. Rasyid, M., H. Yuliani, and L. Angraeni. *Toxicity Test LC50 of Pineung Nyen Teusalee Seeds (Areca catechu) Extract by Brine Shrimp Lethality Test (BSLT) Methode*. in *IOP Conference Series: Earth and Environmental Science*. 2020. IOP Publishing.

164. Mading, M., et al., *Effects of areca catechu L. seed extract on mortality anopheles vagus larvae.* KEMAS: Jurnal Kesehatan Masyarakat, 2018. 13(3): p. 366-373.

165. Tang, S.-N., et al., *Three new areca alkaloids from the nuts of Areca catechu.* Journal of Asian natural products research, 2017. 19(12): p. 1155-1159.

166. Meutia Sari, L., G. Subita, and E. Auerkari, *Potential antioxidant and cytotoxic activities of areca nut (Areca catechu Linn.) extract in human oral squamous cell carcinoma and keratinocyte cells.* Asian Journal of Pharmaceutical and Clinical Research, 2017. 10: p. 286.

167. Sari, L.M., et al., *Acute oral toxicity study of areca catechu linn. aqueous extract in Sprague Dawley rats.* Asian J Pharm Clin Res, 2014. 7(5): p. 20-22.

168. Peng, W., et al., *Areca catechu L.(Arecaceae): A review of its traditional uses, botany, phytochemistry, pharmacology and toxicology.* Journal of ethnopharmacology, 2015. 164: p. 340-356.

169. Alhassan, A.M. and Q.U. Ahmed, *Averrhoa bilimbi Linn.: A review of its ethnomedicinal uses, phytochemistry, and pharmacology.* Journal of pharmacy & bioallied sciences, 2016. 8(4): p. 265.

170. Setyawan, H., S. Sukardi, and B. Nareswari. *The phytochemical potential of Averrhoa bilimbi–A review*. in *IOP Conference Series: Earth and Environmental Science*. 2021. IOP Publishing.

171. Arifin, R.N.A.R. and J. Jumal, *Antioxidant Activity of Averrhoa bilimbi Linn. Leaves Extract Using Two Different Types of Solvents.* Malaysian Journal of Science Health & Technology, 2021. 7(Special Issue).

172. Fidrianny, I., A. Rahmawati, and R. Hartati, *Comparison profile of different extracts of Averrhoa Bilimbi L. in Antioxidant Properties and phytochemical content.* Rasayan Journal of Chemistry, 2018. 11(4): p. 1628-1634.

173. Das, S.C., et al., *Antibacterial and cytotoxic activities of methanolic extracts of leaf and fruit parts of the plant Averrhoa bilimbi (Oxalidaceae).* American Journal of Scientific and Industrial Research, 2011. 2(4): p. 531-536.

174. Nair, M.S., et al., *Anticancer activity of fruit and leaf extracts of Averrhoa bilimbi on mcf-7 human breast cancer cell lines: a preliminary study.* Austin J Pharmacol Ther, 2016. 4(2): p. 1082.

175. Binti Othman, F., N. Hashim, and N. Abdullah, *TOXICITY EVALUATION OF A. BILIMBI L. FRUIT EXTRACT ON HAEMATOLOGICAL AND HISTOPATHOLOGICAL ANALYSIS IN ANIMAL MODEL*. 2019.

176. *Azima sarmentosa (Bl.) Benth. et Hook. f. in Flora of China @ efloras.org" eFlora. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, Cambridge, MA., 2008. Web. Accessed February 2018.*

177. Lumlerdkij, N., *Thai traditional medicine as a source for cancer prevention: from local concepts to the discovery of potential chemopreventive extracts*. 2018, UCL (University College London).

178. Polyium, U. and P. Na Thaisong, *Phytochemical and Nutritional Values of Local Plants in the Phraek Nam Daeng Community Samut Songkhram Province Thailand.* Applied Mechanics and Materials, 2018. 879: p. 101-107.

179. Julsrigival, J., et al., *Antiviral medicinal plants found in Lanna traditional medicine.* Chinese herbal medicines, 2021. 13(4): p. 494-501.

180. Chungsamarnyart, N., S. Jiwajinda, and W. Jansawan, *Acaricidal effect of plant crude-extracts on tropical cattle ticks (Boophilus microplus).* 1991.

181. Chungsamarnyart, N., et al., *Effective Plant Crude-Extracts on the Tick (Boophilus Miscroplus) I. Larvicidal Action.* Agriculture and Natural Resources, 1988. 22(5): p. 37-41.

182. NAM, V.N., *INVENTORY ON THE BIODIVERSITY OF MANGROVE FLORA IN ORDER TO FIND OUT WHICH SPECIES THRIVE IN PARTICULAR ENVIRONMENTS AND PROPOSE SOLUTIONS FOR SUSTAINABLE USE AND MANAGEMENT OF THESE COASTAL RESOURCES IN BAC LIEU PROVINCE.* 2010.

183. Lee, S.R., et al., *Iridoid and phenylethanoid glycosides from the aerial part of Barleria lupulina.* Revista Brasileira de Farmacognosia, 2016. 26(3): p. 281-284.

184. Kumari, R. and S. Kumar, *Cytotoxicity and Mitochondrial-Mediated Apoptosis Induced by Ethanolic Leaf Extract of Barleria lupulina Lindl. in Human Leukemia Cells Via Reactive Oxygen Species Generation.* 2020.

185. Singh, A., S. Dhariwal, and Navneet, *PHARMACOLOGICAL APPLICATIONS OF Barleria lupulina Lindl*. 2018.

186. Sudheer, W. and N. Praveen, *Phytochemical, pharmacological and tissue culture studies of some important species of the genus Barleria L.(Acanthaceae)-a review.* Plant Science Today, 2021. 8(3): p. 491–500-491–500.

187. Kumari, R., et al., *Antibacterial, antioxidant and Immuno-modulatory properties in extracts of Barleria lupulina Lindl.* BMC complementary and alternative medicine, 2017. 17(1): p. 1-11.

188. Kumari, R. and R.C. Dubey, *Phytochemical analysis and antibacterial and cytotoxic properties of Barleria lupulina Lindl. Extracts.* J Plant Pathol Microbiol, 2016. 7(380): p. 2.

189. Banerjee, S., et al., *Conspectus of Phytoconstituents and Pharmacological Activities of Barleria lupulina Lindl.: A Review.* Current Traditional Medicine, 2021. 7(3): p. 326-335.

190. Rajashekara, S., et al., *Biomedical Applications of Biogenic Zinc Oxide Nanoparticles Manufactured from Leaf Extracts of Calotropis gigantea (L.) Dryand.* BioNanoScience, 2020. 10(3): p. 654-671.

191. Parhira, S., et al., *Cardenolides from Calotropis gigantea as potent inhibitors of hypoxia-inducible factor-1 transcriptional activity.* Journal of ethnopharmacology, 2016. 194: p. 930-936.

192. Gyawali, R., et al., ***α**-amylase inhibition, antioxidant activity and phytochemical analysis of Calotropis gigantea (L.) Dryand.* Journal of Health and Allied Sciences, 2020. 10(1): p. 77-81.

193. Kumar, D. and S. Kumar, *Calotropis gigantea (L.) Dryand-A review update.* Indian Journal of Research in Pharmacy and Biotechnology, 2015. 3(3): p. 218.

194. Punia, G., *A REVIEW ON VARIETIES OF ARKA-CALOTROPIS PROCERA (AITON) DRYAND. AND CALOTROPIS GIGANTEA (L.) DRYAND.* Global Journal of Research on Medicinal Plants & Indigenous Medicine, 2013. 2(5): p. 392.

195. Urmi, K.F., et al., *Antioxidant activity and brine shrimp lethality bioassay of different parts of the plant Calotropis gigantea R. Br.* Journal of Pharmaceutical Sciences and Research, 2012. 4(12): p. 2004.

196. Jacinto, S.D., et al., *Cytotoxic cardenolide and sterols from Calotropis gigantea.* Natural Product Communications, 2011. 6(6): p. 1934578X1100600614.

197. Sanyal, S., et al., *Sub-acute toxicity study of Calotropisgigantea latex extracts in male Swiss albino mice.* Toxicology and ForensicMedicine Journal, 2016. 1(2): p. 54-64.

198. Avinash, S., S. Padhi, and K. Barik, *Phytochemical screening and anticancer activity of Calotropis gigantea (L.) Dryand. leaf extract.* 2019. 07: p. 2144-2152.

199. Yee, M.M., *A Comparative Studies on Antimicrobial Activity and Antioxidant Activity of Different Extracts of Green Tea Camellia sinensis (L.) Kuntze Leaf from Southern Shan State (Myanmar).*

200. U, A., et al., *Review on Camellia sinensis –Nature's Gift.* International Journal of Pharmacognosy and Phytochemical Research, 2017. 9.

201. Bhandari, L., M.R. Bhatta, and R. Ranjitkar, *Phytochemicals, Polyphenols and Antioxidant Activity of Camellia sinensis (L.) Kuntze (Tea Leaf) from Ilam District, Nepal.* JOURNAL OF PLANT RESOURCES, 2018. 16(1): p. 78.

202. Nazliniwaty, T. and L. Laila, *Antioxidant Activity Test of Green Tea (Camellia sinensis L. Kuntze) Ethanolic Extract using DPPH Method.* 2020.

203. Namita, P., R. Mukesh, and K.J. Vijay, *Camellia sinensis (green tea): a review.* Global journal of pharmacology, 2012. 6(2): p. 52-59.

204. Ekayanti, M., R. Sauriasari, and B. Elya, *Dipeptidyl peptidase IV inhibitory activity of fraction from white tea ethanolic extract (Camellia sinensis (L.) Kuntze) ex vivo.* Pharmacognosy Journal, 2018. 10(1).

205. Sayeed, M.A., et al., *Investigation of Cytotoxic and Thrombolytic Effect of Ethanolic Extract of White Tea (Camellia sinensis).* International Journal of Advances in Pharmaceutical Research, 2013. 4: p. 1490-1493.

206. Esghaei, M., et al., *Evaluation of anticancer activity of Camellia sinensis in the Caco-2 colorectal cancer cell line.* Asian Pacific journal of cancer prevention: APJCP, 2018. 19(6): p. 1697.

207. Li, B., et al., *Safety evaluation of tea (Camellia sinensis (L.) O. Kuntze) flower extract: Assessment of mutagenicity, and acute and subchronic toxicity in rats.* Journal of ethnopharmacology, 2011. 133(2): p. 583-590.

208. Ekayanti, M., et al., *Pharmacognostic and Phytochemical Standardization of White Tea Leaf (Camellia sinensis L. Kuntze) Ethanolic Extracts.* Pharmacognosy Journal, 2017. 9: p. 221-226.

209. *https://www.agefotostock.com/age/en/details-photo/indian-spices-chilly-red-capsicum-annuum-linn-hin-lalmirca-hanging-on-plant-india/ESY-000549278*

210. rights are reserved by Syeda, A. and N. Fathima, *A Systemic Review on Phytochemistry and Pharmacological Activities of Capsicum annuum.*

211. Materska, M. and I. Perucka, *Antioxidant activity of the main phenolic compounds isolated from hot pepper fruit (Capsicum annuum L.).* Journal of Agricultural and food Chemistry, 2005. 53(5): p. 1750-1756.

212. Khan, F.A., et al., *Pharmacological importance of an ethnobotanical plant: Capsicum annuum L.* Natural product research, 2014. 28(16): p. 1267-1274.

213. Winter, C., M. Schultz, and M. Gutterres, *Evaluation of polymer resins and films formed by leather finishing.* Latin Amer. Applied Research, 2015. 45: p. 213-217.

214. Sinisgalli, C., et al., *Phytochemical profile of Capsicum annuum L. cv Senise, incorporation into liposomes, and evaluation of cellular antioxidant activity.* Antioxidants, 2020. 9(5): p. 428.

215. Chilczuk, B., et al., *Diversity of the Chemical Profile and Biological Activity of Capsicum annuum L. Extracts in Relation to Their Lipophilicity.* Molecules, 2021. 26(17): p. 5215.

216. Lagu, C. and F. Kayanja, *Acute toxicity profiles of aqueous and ethanolic extracts of Capsicum annum seeds from South Western Uganda*. 2013: InTech.

217. Minh, N.P., et al., *Application of guar gum as edible coating to prolong shelf life of red chilli pepper (Capsicum frutescens L.) fruit during preservation.* Journal of Pharmaceutical Sciences and Research, 2019. 11(4): p. 1474-1478.

218. Kavatagimath, S.A., et al., *In-vivo Screening of Ethanolic Extract of Antigonon leptopus Flower for Anti-diabetic and Antioxidant Potential.*

219. Natungnuy, K. and S. Poeaim, *Antioxidant and cytotoxic activities of methanolic extracts from Mimusops elengi flowers.* Int J Agr Technol, 2018. 14(5): p. 731-740.

220. Kishore, V., et al., *Toxicity evaluation and chemical composition of Capsicum frutescens for natural control of Asian blue tick, Rhipicephalus (Boophilus) microplus (Acari: Ixodidae).* The Journal of Basic and Applied Zoology, 2021. 82(1): p. 1-10.

221. Elbashir, H.A., et al., *In-vitro Antimicrobial Activity Phytochemical and Cytotoxicity of Methanolic Fruits Extract of Capsicum frutescent.* The Korean Journal of Food & Health Convergence, 2018. 4(4): p. 10-17.

222. Singh, N., et al., *Cytotoxic Effect on MG-63 Cell Line and Antimicrobial and Antioxidant Properties of Silver Nanoparticles Synthesized with Seed Extracts of Capsicum sp.* Records of Natural Products, 2016. 10(1).

223. Kishore, V., et al., *Toxicity evaluation and chemical composition of Capsicum frutescens for natural control of Asian blue tick, Rhipicephalus (Boophilus) microplus (Acari: Ixodidae).* The Journal of Basic and Applied Zoology, 2021. 82(1): p. 53.

224. Johnson Jr, W., *Final report on the safety assessment of capsicum annuum extract, capsicum annuum fruit extract, capsicum annuum resin, capsicum annuum fruit powder, capsicum frutescens fruit, capsicum frutescens fruit extract, capsicum frutescens resin, and capsaicin*. 2007.

225. มหาวิทยาลัยราชภัฏกำแพงเพชร, ส., เรื่อง พริกขี้หนู. ฐานข อมูลท องถิ่น จังหวัดกำแพงเพชร-ตาก, 2020.

226. Zhou, L., M.E.Q. Reyes, and R.E. Paull, *Papaya (Carica papaya L.) Leaf Area Estimation and Single-leaf Net Photosynthetic CO2 Assimilation Rate Following Leaf Defoliation and Fruit Thinning.* HortScience, 2020. 55(11): p. 1861-1864.

227. Vij, T. and Y. Prashar, *A review on medicinal properties of Carica papaya Linn.* Asian Pacific Journal of Tropical Disease, 2015. 5(1): p. 1-6.

228. Saran, P. and R. Choudhary, *Drug bioavailability and traditional medicaments of commercially available papaya: A review.* African Journal of Agricultural Research, 2013. 8(25): p. 3216-3223.

229. Afzan, A., et al., *Repeated dose 28-days oral toxicity study of Carica papaya L. leaf extract in Sprague Dawley rats.* Molecules, 2012. 17(4): p. 4326-4342.

230. Amalia, A., I. Syafitri, and V.D. Prasasty, *Antimalarial effect of flamboyant (Delonix regia) bark and papaya (Carica papaya L.) leaf ethanolic extracts against plasmodium berghei in mice.* Biomedical and Pharmacology Journal, 2017. 10(3): p. 1081-1089.

231. Doughari, J., A. Elmahmood, and S. Manzara, *Studies on the antibacterial activity of root extracts of Carica papaya L.* African Journal of Microbiology Research, 2007. 1(3): p. 037-041.

232. Nisa, F.Z., et al., *Antioxidant activity and total flavonoid of Carica papaya L. leaves with different varieties, maturity and solvent.* Agritech, 2019. 39(1): p. 54-59.

233. Utami, P.W. and T.H. Brotosudarmo. *The activity of Flavonoid Isolates from Papaya (Carica papaya L.) Seed as Pancreatic Lipase Inhibitor*. in *IOP Conference Series: Materials Science and Engineering*. 2019. IOP Publishing.

234. Hidayati, D.N., et al., *Antibacterial activity of fractions from papaya seeds (Carica papaya L.) extract against Escherichia coli and Salmonella typhi and the contributing compounds.* Pharmaciana, 2019. 9(1): p. 183-190.

235. Jr., P.M.G., *Cytotoxic Activity of Carica papaya L. Leaf Ethanolic Extract and Fractions Against Artemia salina Nauplii.* Int. J. Biosci. 18(3), 228-239, March 2021.

236. Khaw, K.-Y., et al., *Compound identification and in vitro cytotoxicity of the supercritical carbon dioxide extract of papaya freeze-dried leaf juice.* Processes, 2020. 8(5): p. 610.

237. Kaur, M., et al., *Ethnomedicinal uses, phytochemistry and pharmacology of Carica papaya plant: A compendious review.* Mini-Reviews in Organic Chemistry, 2019. 16(5): p. 463-480.

238. Hennebelle, T., et al., *Senna alata.* Fitoterapia, 2009. 80(7): p. 385-393.

239. Pieme, C., et al., *Evaluation of acute and subacute toxicities of aqueous ethanolic extract of leaves of Senna alata (L.) Roxb (Ceasalpiniaceae).* African Journal of Biotechnology, 2006. 5(3): p. 283-289.

240. Fatmawati, S., A.S. Purnomo, and M.F.A. Bakar, *Chemical constituents, usage and pharmacological activity of Cassia alata.* Heliyon, 2020. 6(7): p. e04396.

241. Wadkhien, K., et al., *Antiinflammatory effects of rhein and crude extracts from Cassia alata L. in HaCaT cells.* Science, Engineering and Health Studies, 2018. 12(1): p. 19-32.

242. Awal, M., et al., *Brine shrimp toxicity of leaf and seed extracts of Cassia alata Linn. and their antibacterial potency.* J. Med. Sci, 2004. 4(3): p. 188-193.

243. Salamatullah, A.M., et al., *Cyclotrisiloxan and β-Sitosterol rich Cassia alata (L.) flower inhibit HT-115 human colon cancer cell growth via mitochondrial dependent apoptotic stimulation.* Saudi Journal of Biological Sciences, 2021. 28(10): p. 6009-6016.

244. Priyadarshini, L., P. Mazumder, and M. Choudhury, *Acute toxicity and oral glucose tolerance test of ethanol and methanol extracts of antihyperglycaemic plant Cassia alata Linn.* Journal of Pharmacy and Biologycal Sciences, 2014. 9(2): p. 43-46.

245. Ramli, S., W.J. Xian, and N.A. Abd Mutalib, *A Review: Antibacterial activities, antioxidant properties and toxicity profile of centella asiatica.* EDUCATUM Journal of Science, Mathematics and Technology, 2020. 7(1): p. 39-47.

246. Giribabu, N., et al., *Oral administration of Centella asiatica (L.) Urb leave aqueous extract ameliorates cerebral oxidative stress, inflammation, and apoptosis in male rats with type-2 diabetes.* Inflammopharmacology, 2020. 28(6): p. 1599-1622.

247. Leng, D.D., et al., *In vivo disposition and metabolism of madecassoside, a major bioactive constituent in Centella asiatica (L.) Urb.* Journal of Ethnopharmacology, 2013. 150(2): p. 601-608.

248. Veerendra Kumar, M. and Y. Gupta, *Effect of Centella asiatica on cognition and oxidative stress in an intracerebroventricular streptozotocin model of Alzheimer's disease in rats.* Clinical and Experimental Pharmacology and Physiology, 2003. 30(5-6): p. 336-342.

249. Rahajanirina, V., et al., *The influence of certain taxonomic and environmental parameters on biomass production and triterpenoid content in the leaves of Centella asiatica (L.) Urb. from Madagascar.* Chem Biodivers, 2012. 9(2): p. 298-308.

250. Shastry, R.A., et al., *Isolation, characterization and evaluation of endophytic fractions of Centella asiatica (L.) Urb. (Leaves) for the management of Alzheimer's disease.* Annals of Phytomedicine-an International Journal, 2020. 9(1): p. 171-180.

251. Soyingbe, O.S., N.I. Mongalo, and T.J. Makhafola, *In vitro antibacterial and cytotoxic activity of leaf extracts of Centella asiatica (L.) Urb, Warburgia salutaris (Bertol. F.) Chiov and Curtisia dentata (Burm. F.) C.A.Sm - medicinal plants used in South Africa.* BMC Complement Altern Med, 2018. 18(1): p. 315.

252. Joshi, V.P., et al., *Chemical composition of the essential oil of Centella asiatica (L.) Urb. from western Himalaya.* Natural Product Communications, 2007. 2(5): p. 587-590.

253. Puttarak, P., et al., *Effects of Centella asiatica (L.) Urb. on cognitive function and mood related outcomes: A Systematic Review and Meta-analysis.* Scientific Reports, 2017. 7.

254. Rafamantanana, M.H., et al., *An improved HPLC-UV method for the simultaneous quantification of triterpenic glycosides and aglycones in leaves of Centella asiatica (L.) Urb (APIACEAE).* Journal of Chromatography B-Analytical Technologies in the Biomedical and Life Sciences, 2009. 877(23): p. 2396-2402.

255. Zainol, M.K., et al., *Antioxidative activity and total phenolic compounds of leaf, root and petiole of four accessions of Centella asiatica (L.) Urban.* Food Chemistry, 2003. 81(4): p. 575-581.

256. Pittella, F., et al., *Antioxidant and cytotoxic activities of Centella asiatica (L) Urb.* Int J Mol Sci, 2009. 10(9): p. 3713-21.

257. Alqahtani, A., et al., *Seasonal Variation of Triterpenes and Phenolic Compounds in Australian Centella asiatica (L.) Urb.* Phytochem Anal, 2015. 26(6): p. 436-43.

258. Alqahtani, A., et al., *Seasonal variation of triterpenes and phenolic compounds in Australian Centella asiatica (L.) Urb.* Phytochemical analysis, 2015. 26(6): p. 436-443.

259. Deshpande, P.O., V. Mohan, and P. Thakurdesai, *Preclinical safety assessment of standardized extract of Centella asiatica (L.) urban leaves.* Toxicology international, 2015. 22(1): p. 10.

260. Sabaragamuwa, R., .O. Perera, and B. Fedrizzi, *Centella asiatica (Gotu kola) as a neuroprotectant and its potential role in healthy ageing.* Trends in Food Science & Technology, 2018. 79: p. 88-97.

261. Kang, N.J., et al., *Cinnamomum camphora Leaves Alleviate Allergic Skin Inflammatory Responses In Vitro and In Vivo.* Toxicol Res, 2019. 35(3): p. 279-285.

262. Xiao, S., et al., *The anti-inflammatory potential of Cinnamomum camphora (L.) J. Presl essential oil in vitro and in vivo.* Journal of Ethnopharmacology, 2021. 267: p. 113516.

263. Li, Y.-R., et al., *Investigation of constituents from Cinnamomum camphora (L.) J. Presl and evaluation of their anti-inflammatory properties in lipopolysaccharide-stimulated RAW 264.7 macrophages.* Journal of ethnopharmacology, 2018. 221: p. 37-47.

264. Wagan, T.A., et al., *Evaluation of the chemical composition and bioactivity of essential oils from Cinnamomum camphora (L.) J. Presl.(Lauraceae), Piper nigrum L.(Piperaceae) and Stemona japonica (Miq.)(Stemonaceae) against Oryzaephilus surinamensis (Linnaeus, 1758)(Coleoptera: Silvanidae).* Polish Journal of Entomology, 2019. 88(3): p. 199-213.

265. Batiha, G.E.-S., et al., *Syzygium aromaticum L.(Myrtaceae): Traditional uses, bioactive chemical constituents, pharmacological and toxicological activities.* Biomolecules, 2020. 10(2).

266. Yang, H., et al., *Anti-Tyrosinase and Antioxidant Activity of Proanthocyanidins From Cinnamomum Camphora.* 2021.

267. Satyal, P., et al., *Bioactivities and compositional analyses of Cinnamomum essential oils from Nepal: C. camphora, C. tamala, and C. glaucescens.* Natural product communications, 2013. 8(12): p. 1934578X1300801232.

268. Wang, J., W. Zhang, and H. Huang, *'Yongjin','Xiaguang'and 'Yuhuang': Three Ornamental Cultivars of Cinnamomum camphora.* HortScience, 2015. 50(5): p. 762-764.

269. *Orwa C, Mutua A , Kindt R , Jamnadass R, Simons A. 2009. Agroforestree Database:a tree reference and selection guide*

version 4.0

270. Singh, N., et al., *Phytochemical and pharmacological review of Cinnamomum verum J. Presl-a versatile spice used in food and nutrition.* Food Chemistry, 2021. 338: p. 127773.

271. Sharifi-Rad, J., et al., *Cinnamomum Species: Bridging Phytochemistry Knowledge, Pharmacological Properties and Toxicological Safety for Health Benefits.* Frontiers in pharmacology, 2021. 12: p. 600139-600139.

272. Kankeaw, U. and E. Masong, *The antioxidant activity from hydroquinone derivatives by the synthesis of Cinnamomium verum J. Presl Bark's extracted.* International Journal of Chemical Engineering and Applications, 2015. 6(2): p. 91.

273. Muthiah, M., *Evaluation of Brine Shrimp Lethality of Cinnamomum Species.* Ethnobotanical Leaflets, 2008. 12.

274. Yang, S.-m., et al., *Molecular mechanism of Cinnamomum verum component cuminaldehyde inhibits cell growth and induces cell death in human lung squamous cell carcinoma NCI-H520 cells in vitro and in vivo.* Journal of Cancer, 2016. 7(3): p. 251.

275. Yaradua, I., et al., *Phytochemical Screening, Acute (LD50) and Sub-Chronic Toxicity Studies of Aqueous Stem Bark Extract of Cinnamomum Verum.* 2018.

276. Costa, R., et al., *Antimicrobial activity and chemical composition of Citrus aurantifolia (Christm.) Swingle essential oil from Italian organic crops.* Journal of Essential Oil Research, 2014. 26(6): p. 400-408.

277. Lin, L.Y., et al., *Lime (Citrus aurantifolia (Christm.) Swingle) Essential Oils: Volatile Compounds, Antioxidant Capacity, and Hypolipidemic Effect.* Foods, 2019. 8(9).

278. Ajaiyeoba, E., et al., *Radical scavenging and cytotoxicity evaluation of eight extracts of Citrus limon and Citrus aurantifolia.* Nigerian Journal of Natural Products and Medicine, 2016. 20: p. 121-127.

279. Enejoh, O.S., et al., *Ethnomedical importance of Citrus aurantifolia (christm) swingle.* The Pharma Innovation, 2015. 4(8, Part A): p. 1.

280. Karthikeyan, V., *Citrus aurantium (Bitter Orange): A Review of its Traditional Uses, Phytochemistry and Pharmacology.* INTERNATIONAL JOURNAL OF DRUG DISCOVERY AND HERBAL RESEARCH (IJDDHR), 2014. 4: p. 766-772.

281. Poomirat, S., et al., *Cytotoxicity against Cervical and Breast Cancer Cells of Leard-Ngam Remedy and Its Plant Compositions.* Science & Technology Asia, 2020: p. 38-50.

282. Tijjani, M.A., et al., *Phytochemical Screening, Acute Toxicity and Anti-Nociceptive Activity of Methanol Stem Bark Extract of Citrus aurantifolia Linn.*

283. Mazraie, M.A., et al., *Spread and colonization pattern of 'Candidatus Phytoplasma aurantifolia' in lime plants [Citrus aurantifolia (Christm.) Swingle] as revealed by real-time PCR assay.* Journal of Plant Pathology, 2019. 101(3): p. 629-637.

284. Munankarmi, N.N., et al., *Characterization of the Genetic Diversity of Acid Lime (Citrus aurantifolia (Christm.) Swingle) Cultivars of Eastern Nepal Using Inter-Simple Sequence Repeat Markers.* Plants-Basel, 2018. 7(2).

285. Anuchapreeda, S., et al., *Isolation and biological activity of agrostophillinol from kaffir lime (Citrus hystrix) leaves.* Bioorganic & Medicinal Chemistry Letters, 2020. 30(14): p. 127256.

286. Agouillal, F., et al., *A Review of Genetic Taxonomy, Biomolecules Chemistry and Bioactivities of Citrus Hystrix DC.* Biosciences Biotechnology Research Asia, 2017. 14(1): p. 285.

287. Masruri, M., et al. *The effect of kaffir lime (Citrus hystrix DC) essential oil on bioplastic derived from cassava peel waste*. in *Journal of Physics: Conference Series*. 2019. IOP Publishing.

288. Sreepian, A., et al., *Antibacterial activity of essential oil extracted from Citrus hystrix (Kaffir Lime) peels: An in vitro study.* Tropical Biomedicine, 2019. 36(2): p. 531-541.

289. Chueahongthong, F., et al., *Cytotoxic effects of crude kaffir lime (Citrus hystrix, DC.) leaf fractional extracts on leukemic cell lines.* Journal of Medicinal Plants Research, 2011. 5(14): p. 3097-3105.

290. Raksakantong, P., S. Siriamornpun, and N. Meeso, *Effect of drying methods on volatile compounds, fatty acids and antioxidant property of Thai kaffir lime (Citrus hystrix DC).* International journal of food science & technology, 2012. 47(3): p. 603-612.

291. Chowdhury, A., et al., *Antimicrobial, antioxidant and cytotoxic activities of Citrus hystrix DC. fruits.* Dhaka University Journal of Pharmaceutical Sciences, 2009. 8(2): p. 177-180.

292. Wijayanti, N., W. Tunjung, and Y. Setyawati, *Cytotoxicity and apoptosis induction by kaffir lime leaves extract (Citrus hystrix DC.) in HeLa cells culture (human cervical cancer cell line).* KnE Life Sciences, 2015: p. 631-631.

293. Tunjung, W.A.S., et al., *Evaluation of Anticancer Bioactive Compounds and Cytotoxicity of Kaffir Lime (Citrus hystrix Dc.) Callus Extract Post Preservation.* Indonesian Journal of Pharmacy, 2021: p. 179-192.

294. Ningombam, D., et al., *Phytochemical, Antimicrobial and Acute Toxicity Studies on Methanolic Extracts of Citrus medica L. and Citrus hystrix DC Fruits.* 2021.

295. Sedeek, M.S., et al., *Botanical and genetic characterization of Citrus maxima (BURM.) Merrill. F. Rutaceae.* Int J Pharm Pharm Sci, 2017. 9(1): p. 260-72.

296. Reshmi, S., et al., *Identification of bioactive compound from Citrus maxima fruit against carbohydrate-hydrolysing enzymes.* Current Science (00113891), 2018. 114(10).

297. Ali, M., et al., *Antioxidant potential, subacute toxicity, and beneficiary effects of methanolic extract of pomelo (Citrus grandis L. Osbeck) in long evan rats.* Journal of toxicology, 2019. 2019.

298. Khan, N.H., C. Qian, and N. Perveen, *Phytochemical screening, antimicrobial and antioxidant activity determination of citrus maxima peel.* Pharmacy & Pharmacology International Journal, 2018. 6(4): p. 279-285.

299. Wang, F., et al., *On higher nutritional and medical properties of a carotenoid-rich mutant pomelo (Citrus maxima (L.) Osbeck).* Industrial Crops and Products, 2019. 127: p. 142-147.

300. Matsuo, Y., et al., *Comparison of Antioxidant Properties of Different Crude Extracts from Citrus natsudaidai Peel.* Food Science and Technology Research, 2020. 26(6): p. 837-846.

301. Tsai, W.-C. and Y.-H. Wong, ***α**-Glucosidase Inhibitory Activity and Antioxidant Activity of Pomelo (Citrus grandis) Peel, Albedo, and Flavedo Extracts.* Taiwanese Journal of Agricultural Chemistry & Food Science, 2019. 57(4).

302. Islam, A., et al., *In Vitro Antioxidant and In Vivo Antidiabetic Properties of Citrus Maxima Leaf Extracts in Alloxan-Induced Swiss Albino Diabetic Mice.* Asian Food Sci J, 2021: p. 66-79.

303. Lin, L.-Y., et al., *Pomelo fruit wastes are potentially valuable antioxidants, anti-inflammatories, antihypertensives, and antihyperglycemics.* Horticulture, Environment, and Biotechnology, 2021. 62(3): p. 377-395.

304. Haida, Z. and M. Hakiman, *A review of therapeutic potentials of Clinacanthus nutans as source for alternative medicines.* Sains Malaysiana, 2019. 48(12): p. 2683-2691.

305. Chuah, P.N., et al., *Comparative conventional extraction methods of ethanolic extracts of Clinacanthus nutans leaves on antioxidant activity and toxicity.* British Food Journal, 2020.

306. Febriansah, R. and I.A. Dewayanti. *Chemopreventive Activity of Clinacanthus nutans L. Ethyl Acetate Fraction on Breast Cancer Cells Line*. in *4th International*

Conference on Sustainable Innovation 2020–Health Science and Nursing (ICoSIHSN 2020). 2021. Atlantis Press.

307. Fong, S.Y., *Genetic, phytochemical and bioactivity studies of Clinacanthus nutans (Burm. f.) Lindau (Acanthaceae).* RMIT University, 2015.

308. Chahal, K., et al., *Chemical composition and biological activity of Coriandrum sativum L.: A review.* Indian Journal of Natural Products and Resources (IJNPR)[Formerly Natural Product Radiance (NPR)], 2018. 8(3): p. 193-203.

309. Munasinghe, M., et al., *Blood sugar lowering effect of Coccinia grandis (L.) J. Voigt: path for a new drug for diabetes mellitus.* Experimental diabetes research, 2011. 2011.

310. Pulbutr, P., et al., *Research Article In vitro α-amylase and α-glucosidase Inhibitory Activities of Coccinia grandis Aqueous Leaf and Stem Extracts.* 2017.

311. Ramachandran, A., R. Prasath, and A. Anand, *The medical uses of Coccinia grandis L. Voigt: a review.* International journal of pharmacognosy, 2015. 69(7): p. 1-6.

312. Doka, I.G., S. El Tigani, and S. Yagi, *Amino acid content, fatty acid profile and radical scavenging capacities of Coccinia grandis (L.) Voigt. fruits.* Advance Journal of Food Science and Technology, 2014. 6(12): p. 1307-1312.

313. Pramanik, A., et al., *Coccinia grandis (L.) Voigt leaf extract exhibits antileishmanial effect through pro-inflammatory response: An in vitro study.* Current microbiology, 2017. 74(1): p. 59-67.

314. Umamaheswari, M. and T. Chatterjee, *In vitro antioxidant activities of the fractions of Coccinia grandis L. leaf extract.* African Journal of Traditional, Complementary and Alternative Medicines, 2008. 5(1): p. 61-73.

315. al-Mamun, M., et al., *Brine shrimp toxicity study of different Bangladeshi medicinal plants.* Advances in Natural and Applied Sciences, 2010. 4(2): p. 163-173.

316. Alamgir, A. and M. Rahman, *Phytochemical Characteristics, Antimitotic, Cytotoxic and Antiinflamatory Activities of Coccinia grandis (L.) J. Voigt.* Alamgir ANM, Rahman M and Rahman A, 2014: p. 218-225.

317. Lahiry, S., et al., *Ethanolic leaf extract of Coccinia grandis is effective against both drug resistant and drug sensitive clinical isolates of Indian Kala-azar.* Journal of Parasitic Diseases, 2018. 42(3): p. 433-441.

318. Kundu, M., R. Mazumder, and M. Kushwaha, *Evaluation of hepatoprotective activity of ethanol extract of Coccinia grandis (L.) Voigt. leaves on experimental rats by acute and chronic models.* Oriental Pharmacy and Experimental Medicine, 2012. 12(2): p. 93-97.

319. Lima, E.B.C., et al., *Cocos nucifera (L.) (Arecaceae): A phytochemical and pharmacological review.* Brazilian Journal of Medical and Biological Research, 2015. 48(11): p. 953-964.

320. *Medicinal Benefits of Coconut Oil.*

321. Intahphuak, S., P. Khonsung, and A. Panthong, *Anti-inflammatory, analgesic, and antipyretic activities of virgin coconut oil.* Pharmaceutical Biology, 2010. 48(2): p. 151-157.

322. Adebayo, J.O., et al., *Antimalarial Activity of Cocos nucifera Husk Fibre: Further Studies.* Evid Based Complement Alternat Med, 2013. 2013: p. 742476.

323. Kalina, S. and S.B. Navaratne, *Analysis of Antioxidant Activity and Texture Profile of Tender-Young and King Coconut (Cocos nucifera) Mesocarps under Different Treatments and the Possibility to Develop a Food Product.* Int J Food Sci, 2019. 2019: p. 7470696.

324. Koschek, P.R., et al., *The husk fiber of Cocos nucifera L. (Palmae) is a source of anti-neoplastic activity.* Braz J Med Biol Res, 2007. 40(10): p. 1339-43.

325. Akter, S., et al., *Pharmacological effect of methanolic and hydro-alcoholic extract of Coconut endocarp.* J. Adv. Biotechnol. Exp. Ther, 2020. 3: p. 171-181.

326. NasimunIslam, N., et al., *Cytotoxic Property of Cocos nucifera shell Extracts on HeLa Cells.* Research Journal of Pharmacy and Technology, 2014. 7(5): p. 521.

327. George, V., et al., *Cocos nucifera L. inflorescence extract: An effective hepatoprotective agent.* Indian Journal of Traditional Knowledge (IJTK), 2019. 19(1): p. 128-136.

328. Gordon, A. and J. Jackson, *Case study: application of appropriate technologies to improve the quality and safety of coconut water*, in *Food Safety and Quality Systems in Developing Countries*. 2017, Elsevier. p. 185-216.

329. Sudhakar, P., et al., *Colocasia esculenta (L.) Schott: Pharmacognostic and pharmacological review.* Phytopathology, 2020. 9: p. 1382-1386.

330. Krishnapriya, T. and A. Suganthi, *Biochemical and phytochemical analysis of Colocasia esculenta (L.) Schott tubers.* International Journal of Research in Pharmacy and Pharmaceutical Sciences, 2017. 2(3): p. 21-25.

331. Oriyomi, V.O., et al., *Biotoxicity of Colocasia esculenta [Linn.]: Involvement of Colocasia esculenta leaf in preservation of staple from Sitophilus zeamais [Motschulsky] attack.* Industrial Crops and Products, 2022. 182: p. 114897.

332. Jyothi, R., *Cytotoxic potentiality of Colocasia esculenta leaves extract on five different cancer cell lines using 3-(4, 5-Dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide assay.* International Journal of Green Pharmacy (IJGP), 2020. 14(4).

333. Azubike, N., et al., *Subacute toxicity profile of the leaves of Colocasia esculenta [L. Schott] in albino rats.* Research Journal of Medicinal Plants [Internet], 2016. 1: p. 10.

334. Sriti, J., et al., *Chemical composition and antioxidant activities of Tunisian and Canadian coriander (Coriandrum sativum L.) fruit.* Journal of Essential Oil Research, 2011. 23(4): p. 7-15.

335. Sharopov, F., et al., *Chemical composition and anti-proliferative activity of the essential oil of Coriandrum sativum L.* Am. J. Essent. Oils Nat. Prod, 2017. 5: p. 11-15.

336. Sriti, J., et al., *Antioxidant properties and polyphenol contents of different parts of coriander (Coriandrum sativum L.) fruit.* La Rivista Italiana Delle Sostanze Grasse, 2012. 49: p. 253-262.

337. Demir, S. and M. Korukluoglu, *A comparative study about antioxidant activity and phenolic composition of cumin (Cuminum cyminum L.) and coriander (Coriandrum sativum L.).* Indian Journal of Traditional Knowledge (IJTK), 2020. 19(2): p. 383-393.

338. Dutta, S., et al., *Antioxidant and free radical scavenging activity of Trigonella foenum-graecum L, Murraya koenigii, Coriandrum sativum and Centella asiatica.* Turkish Journal of Agriculture-Food Science and Technology, 2016. 4(4): p. 255-261.

339. Jeya, K., M. Veerapagu, and V. Sangeetha, *Antimicrobial and antioxidant properties of Coriandrum sativum L. seed essential oil.* American Journal of Essential Oils and Natural Products, 2019. 7(2): p. 06-10.

340. Elmas, L., et al., *The determination of the potential anticancer effects of Coriandrum sativum in PC‐3 and LNCaP prostate cancer cell lines.* Journal of cellular biochemistry, 2019. 120(3): p. 3506-3513.

341. Kačániová, M., et al., *Antioxidant, antimicrobial and antibiofilm activity of coriander (Coriandrum sativum L.) essential oil for its application in foods.* Foods, 2020. 9(3): p. 282.

342. Fayyad, G., et al., *Evaluation of biological activities of seeds of Coriandrum sativum.* International Journal of Scientific and Engineering Research, 2017. 8(7): p. 1058-1063.

343. Dharamatti, V., *Cultivation of Coriander (Coriandrum sativum L.): A Review Article.* International Journal of Pure & Applied Bioscience, 2017. 5: p. 796-802.

344. Belal, A.A., F.B. Ahmed, and L.I. Ali, *Antibacterial activity of Cuminum cyminum L. oil on six types of bacteria.* American Journal of BioScience, 2017. 5(4): p. 70-73.

345. Ghasemi, G., et al., *Antioxidant and antifungal activities of a new chemovar of cumin (Cuminum cyminum L.).* Food science and biotechnology, 2019. 28(3): p. 669-677.

346. Sun, Y., et al., *Antifungal activity and action mode of cuminic acid from the seeds of Cuminum cyminum L. against Fusarium oxysporum f. sp. niveum (FON) causing Fusarium wilt on watermelon.* Molecules, 2017. 22(12): p. 2053.

347. Goodarzi, S., et al., *Cuminum cyminum fruits as source of luteolin-7-O-glucoside, potent cytotoxic flavonoid against breast cancer cell lines.* Natural product research, 2020. 34(11): p. 1602-1606.

348. Abbaszadegan, A., et al., *Antimicrobial and cytotoxic activity of Cuminum cyminum as an intracanal medicament compared to chlorhexidine gel.* Iranian endodontic journal, 2016. 11(1): p. 44.

349. Dinparvar, S., et al., *A nanotechnology-based new approach in the treatment of breast cancer: Biosynthesized silver nanoparticles using Cuminum cyminum L. seed extract.* Journal of Photochemistry and Photobiology B: Biology, 2020. 208: p. 111902.

350. Haddad, B., et al., *Organ toxicity and estrogen like effects of cuminum cyminum. l seed essential oil: a hormonal, histopathological and immunohistochemical study in female mice.* J. Pharm. Sci, 2018. 4: p. 1-11.

351. Singh, N., et al., *A review on traditional uses, phytochemistry, pharmacology, and clinical research of dietary spice Cuminum cyminum L.* Phytotherapy Research, 2021. 35(9): p. 5007-5030.

352. Verma, R.K., et al., *Medicinal properties of turmeric (Curcuma longa L.): A review.* Int. J. Chem. Stud, 2018. 6(4): p. 1354-1357.

353. Kukula-Koch, W., et al., *Superior anticancer activity is demonstrated by total extract of Curcuma longa L. as opposed to individual curcuminoids separated by centrifugal partition chromatography.* Phytotherapy Research, 2018. 32(5): p. 933-942.

354. Rezvanirad, A., et al., *Curcuma longa: A review of therapeutic effects in traditional and modern medical references.* Journal of Chemical and Pharmaceutical Sciences, 2016. 9(4): p. 3438-3448.

355. Murugan, S., et al., *Safety Evaluation of Standardized Extract of Curcuma longa (NR-INF-02): A 90-Day Subchronic Oral Toxicity Study in Rats.* BioMed Research International, 2021. 2021.

356. Niranjan, A. and D. Prakash, *Chemical constituents and biological activities of turmeric (Curcuma longa l.)-a review.* Journal of Food Science and Technology, 2008. 45(2): p. 109.

357. Gofir, A., et al., *The effect of Centella asiatica L. Urban. and Curcuma longa L. extracts combination in improving memory performance in stroke model rats and its acute toxicity.* Indonesian Journal of Pharmacology and Therapy. 2(2).

358. Hosseini, A. and H. Hosseinzadeh, *Antidotal or protective effects of Curcuma longa (turmeric) and its active ingredient, curcumin, against natural and chemical toxicities: A review.* Biomedicine & pharmacotherapy, 2018. 99: p. 411-421.

359. Toda, S., et al., *Natural antioxidants. III. Antioxidative components isolated from rhizome of Curcuma longa L.* Chemical and Pharmaceutical Bulletin, 1985. 33(4): p. 1725-1728.

360. Sharma, K.R. and R. Kharel, *Antibacterial, Antidiabetic and Brine Shrimp Lethality Activities of Some Selected Medicinal Plants from Kavrepalanchok District of Nepal.* Journal of Institute of Science and Technology, 2019. 24(1): p. 57-62.

361. Abdel-Lateef, E., et al., *Bioactive chemical constituents of Curcuma longa L. rhizomes extract inhibit the growth of human hepatoma cell line (HepG2).* Acta Pharmaceutica, 2016. 66(3): p. 387-398.

362. Habtemariam, S., *Chapter 20 - The chemical and pharmacological basis of turmeric (Curcuma longa L.) as potential therapy for type 2 diabetes and metabolic*

syndrome, in *Medicinal Foods as Potential Therapies for Type-2 Diabetes and Associated Diseases*, S. Habtemariam, Editor. 2019, Academic Press. p. 751-789.

363. Ogu, G.I., et al., *Antimicrobial and phytochemical evaluation of the leaf, stem bark and root extracts of Cyathula prostrata (L) Blume against some human pathogens.* Journal of Complementary Medicine Research, 2012. 1(1): p. 35-43.

364. Abdallah, E.M., *Antibacterial potential of fresh fruit juices against multi-drug resistant pathogens.* Journal of Acute Disease, 2020. 9(2): p. 83.

365. Richard, D.K., et al., *Ethanol-induced gastric ulceration in rats: Protective roles of methanol and water extracts of Cyathula prostrata Linn Blume.* Journal of Pharmacognosy and Phytochemistry, 2017. 6(5): p. 1515-1517.

366. Sowemimo, A., et al., *Cytotoxic activity of selected Nigerian plants.* African Journal of Traditional, Complementary and Alternative Medicines, 2009. 6(4).

367. Schnablegger, G., et al., *Cyathula prostrata ethanol extract activates the extrinsic pathway of apoptosis in HeLa and U937 cell lines.* South African Journal of Botany, 2013. 88: p. 380-387.

368. Ogbonnia, S., et al., *Evaluation of acute toxicity and hypoglycaemic and hypolipidaemic effects of Cyathula prostata (Linn.) Blume weeds on adult rats.* Journal of Pharmaceutical Research International, 2016: p. 1-11.

369. Oladimeji, O.H. and C.O. Usifoh, *Anti-inflammatory Activity of Cyathula prostrata (L.) Blume.* African Journal of Pharmacology and Therapeutics, 2015. 4(1).

370. Mathialagan, R., et al., *Comparison of chemical composition and toxicity of essential oils from lemongrass (Cymbopogon citratus) extracted with microwave-assisted hydrodistillation (MAH) and conventional hydrodistillation (HD) methods.* J. Adv. Nat. Sci, 2014. 1(1): p. 10-15.

371. Leon-Anzueto, E., et al., *Effect of vermicompost, worm-bed leachate and arbuscular mycorrizal fungi on lemongrass (Cymbopogon citratus (DC) Stapf.) growth and composition of its essential oil.* Electronic Journal of Biotechnology, 2011. 14(6).

372. Barbosa, L.C.A., et al., *Evaluation of the chemical composition of Brazilian commercial Cymbopogon citratus (DC) stapf samples.* Molecules, 2008. 13(8): p. 1864-1874.

373. Fouad, R., et al., *Chemical Composition and Herbicidal Effects of Essential Oils of Cymbopogon citratus (DC) Stapf, Eucalyptus cladocalyx, Origanum vulgare L and Artemisia absinthium L. cultivated in Morocco.* Journal of Essential Oil Bearing Plants, 2015. 18(1): p. 112-123.

374. Ragasa, C.Y., et al., *Antimicrobial and cytotoxic terpenoids from Cymbopogon citratus Stapf.* Philipp Sci, 2008. 45: p. 111-22.

375. Cheel, J., et al., *Free radical scavengers and antioxidants from Lemongrass (Cymbopogon citratus (DC.) Stapf.).* Journal of agricultural and food chemistry, 2005. 53(7): p. 2511-2517.

376. Silva, N.B.d., et al., *Anti-Biofilm and Hemolytic Effects of Cymbopogon citratus (Dc) Stapf Essential Oil.* Pesquisa Brasileira em Odontopediatria e Clínica Integrada, 2020. 19.

377. Machraoui, M., et al., *Ethnobotanical and phytopharmacological notes on Cymbopogon citratus (DC.) Stapf.* Journal of new sciences, 2018. 55: p. 3642-3652.

378. Al-Snafi, A.E., *Medical importance of Datura fastuosa (syn: Datura metel) and Datura stramonium-A review.* IOSR Journal of Pharmacy, 2017. 7(2): p. 43-58.

379. Belayneh, Y.M., et al., *Evaluation of in vivo antidiabetic, antidyslipidemic, and in vitro antioxidant activities of hydromethanolic root extract of Datura stramonium L.(Solanaceae).* Journal of experimental Pharmacology, 2019. 11: p. 29.

380. Wang, Y., et al., *Anti-Psoriasis Inflammation And Anti-Oxidation of The Extract From The Flower of Datura Metel L.* 2021.

381. Monira, K.M. and S.M. Munan, *Review on Datura metel: A potential medicinal plant.* Global Journal of Research on Medicinal Plants & Indigenous Medicine, 2012. 1(4): p. 123.

382. Xue, J., et al., *Chemical composition and cytotoxicity of the essential oil from different parts of Datura metel L.* Natural product research, 2016. 30(17): p. 1938-1940.

383. Guo, R., et al., *A new sesquiterpenoid with cytotoxic and anti-inflammatory activity from the leaves of Datura metel L.* Natural product research, 2021. 35(4): p. 607-613.

384. Shifali Thakur, S.C., Isha Kumari, Madhusudan S, Bhawna Walia, Hemlata Kaurav and Gitika Chaudhary, *Datura (datura metel): a review based upon its ayurvedic prospective.*

385. Eleyowo, O.O., et al., *An investigation of phytochemicals, antioxidants and genotoxic potentials of Datura metel L.* 2018.

386. Iqbal, S., C. Sivaraj, and K. Gunasekaran, *Antioxidant and Anticancer Activities of Methanol Extract of Seeds of Datura stramonium l.* Free Radicals and Antioxidants, 2017. 7(2): p. 184-189.

387. Mackeen, M.M., et al., *Brine shrimp toxicity of fractionated extracts of Malaysian medicinal plants.* Natural Product Sciences, 2000. 6(3): p. 131-134.

388. Kuganathan, N. and S. Ganeshalingam, *Chemical analysis of Datura metel leaves and investigation of the acute toxicity on grasshoppers and red ants.* E-Journal of Chemistry, 2011. 8(1): p. 107-112.

389. Céspedes-Méndez, C., P. Iturriaga-Vásquez, and E. Hormazábal, *Secondary metabolites and biological profiles of Datura genus.* Journal of the Chilean Chemical Society, 2021. 66(2): p. 5183-5189.

390. Dr. Iyshwarya HS , D.M.R., *DATURA METEL: A DRUG REVIEW.* 2020.

391. PHUONG, P.T.H., et al., *EXTRACTION OF NATURAL DYE FROM DIOSPYROS MOLLIS (GRIFF.) FRUITS BY MANY DIFFERENT SOLVENTS AND APPLICATION OF DYED ON SILK FABRIC.* Journal of Science and Technology-IUH, 2020. 44(02).

392. Naoki, U., et al., *Diospyros Species in Thailand: Their Distribution, Fruit Morphology and Uses.* Economic Botany, 1998. 52(4): p. 343-351.

393. YOSHIHIRA, K., et al., *Naphthoquinone Derivatives from the Ebenaceae. I. Diospyrol and the Related Naphthoquinones from Diospyros mollis GRIFF.* Chemical and Pharmaceutical Bulletin, 1971. 19(11): p. 2271-2277.

394. Suwama, T., et al., *Naphthalene glycosides in the Thai medicinal plant Diospyros mollis.* Journal of Natural Medicines, 2018. 72(1): p. 220-229.

395. Paphassarang, S., M. Becchi, and J. Raynaud, *A new diospyrol glycoside from Diospyros mollis Griff.* Tetrahedron letters, 1984. 25(5): p. 523-526.

396. Unhanand, M., *Studies on Toxicity of Ma-klua (Diospyros mollis Griff.) Used as a Traditional Anthelmintic in Thailand I.* Bull. Dept. Med. Sci. Ministry Publ. Health (Bangkok), 1982. 24: p. 227.

397. Siriphong, S., P. Meepowpan, and P. Sangthong, *Anti-Breast Cancer Activity of Thai Herbal Medicine Formulation.*

398. *Diospyros mollis Griff.*

399. *Dipterocarpus alatus.*

400. Daodee, S., et al., *Effects of the ethanol extract of Dipterocarpus alatus leaf on the unpredictable chronic mild stress-induced depression in ICR mice and its possible mechanism of action.* Molecules, 2019. 24(18): p. 3396.

401. Khamphukdee, C., et al., *INFERTILE ACTIVITY OF DIPTEROCARPUS ALATUS ROXB. EX G. DON OIL.* ISPBS–5 PROCEEDINGS BOOK, 2019: p. 66.

402. Yongram, C., et al., *Chemical composition, antioxidant and cytotoxicity activities of leaves, bark, twigs and oleo-resin of Dipterocarpus alatus.* Molecules, 2019. 24(17): p. 3083.

403. Puthongking, P., et al., *Dipterocarpol in Oleoresin of Dipterocarpus alatus Attributed to Cytotoxicity and Apoptosis-Inducing Effect.* Molecules, 2022. 27(10): p. 3187.

404. *Dipterocarpus alatus Roxb. Ex G.Don.*

405. Mali, P.Y. and S.S. Panchal, *Euphorbia tirucalli L.: Review on morphology, medicinal uses, phytochemistry and pharmacological activities.* Asian Pacific Journal of Tropical Biomedicine, 2017. 7(7): p. 603-613.

406. de Souza, L.S., et al., *Analytical methods to access the chemical composition of an Euphorbia tirucalli anticancer latex from traditional Brazilian medicine.* Journal of ethnopharmacology, 2019. 237: p. 255-265.

407. do C Caxito, M.L., et al., *Antiproliferative activity of extracts of Euphorbia tirucalli L (Euphorbiaceae) from three regions of Brazil.* Tropical Journal of Pharmaceutical Research, 2017. 16(5): p. 1013-1020.

408. Gupta, N., et al., *Medicinal value of Euphorbia tirucalli.* Systematic Reviews in Pharmacy, 2013. 4(1): p. 40.

409. Aleixo, T., et al., *Phytochemical Screening and Investigation of Antimicrobial Activity from Derivatives of Aveloz (Euphorbia tirucalli L.).* 2018.

410. Altamimi, M., et al., *Antioxidant, anti-enzymatic, antimicrobial and cytotoxic properties of Euphorbia tirucalli L.* bioRxiv, 2019.

411. Aleksandrov, M., V. Maksimova, and L. Koleva Gudeva, *Review of the anticancer and cytotoxic activity of some species from genus Euphorbia.* Agriculturae Conspectus Scientificus, 2019. 84(1): p. 1-5.

412. Furqan, M., S. Lenny, and L. Marpaung, *Isolation of Phenolic Compound and Antibacterial Activity of Phenolic Extract of Patah Tulang (Euphorbia Tirucalli. L).*

413. Munro, B., et al., *Phytochemical, antioxidant and anti-cancer properties of Euphorbia tirucalli methanolic and aqueous extracts.* Antioxidants, 2015. 4(4): p. 647-661.

414. Kumar, A., et al., *Toxicity of aqueous extract of Euphorbia tirucalli latex on catfish, Heteropneustes fossilis.* Ecotoxicology and environmental safety, 2010. 73(7): p. 1671-1673.

415. Zone, G.-E., *16. Garcinia hanburyi Hook. f.* Maintenance of forest genetic resources is of crucial importance to sustainable development. However, global forest loss and degradation is resulting in a dramatic loss of biological diversity and options for utilisation and development. Cambodia is no exception, with several valuable indigenous tree species presently vulnerable to extinction at species, and in particular, at population level.: p. 43.

416. Tao, S.J., et al., *A highly rearranged pentaprenylxanthonoid from the resin of Garcinia hanburyi.* Helvetica Chimica Acta, 2010. 93(7): p. 1395-1400.

417. Doan, L.P., et al., *Fatty acid, tocopherol, sterol compositions and antioxidant activity of three Garcinia seed oils.* Records of Natural Products, 2018. 12(4): p. 323.

418. Panthong, A., et al., *Anti-inflammatory, analgesic and antipyretic activities of the extract of gamboge from Garcinia hanburyi Hook f.* Journal of ethnopharmacology, 2007. 111(2): p. 335-340.

419. Reutrakul, V., et al., *Anti-HIV-1 and Anti-Inflammatory Lupanes from the Leaves, Twigs, and Resin of Garcinia hanburyi.* Planta medica, 2010. 76(04): p. 368-371.

420. Jin, Y.M., et al., *α-Glucosidase inhibitory caged xanthones from the resin of Garcinia hanburyi.* Journal of Applied Biological Chemistry, 2019. 62(1): p. 81-86.

421. Hahnvajanawong, C., et al., *Apoptotic activity of caged xanthones from Garcinia hanburyi in cholangiocarcinoma cell lines.* World journal of gastroenterology: WJG, 2010. 16(18): p. 2235.

422. Lee, P.N.H. and W.S. Ho, *Antiproliferative activity of gambogic acid isolated from Garcinia hanburyi in Hep3B and Huh7 cancer cells.* Oncology reports, 2013. 29(5): p. 1744-1750.

423. *Garcinia hanburyi Hook.f.* 29 Jul 2012.

424. Phopin, K., S. Wanwimolruk, and V. Prachayasittikul, *Food safety in Thailand. 3: Pesticide residues detected in mangosteen (Garcinia mangostana L.), queen of fruits.* Journal of the Science of Food and Agriculture, 2017. 97(3): p. 832-840.

425. Liu, Q.Y., Y.T. Wang, and L.G. Lin, *New insights into the anti-obesity activity of xanthones from Garcinia mangostana.* Food Funct, 2015. 6(2): p. 383-93.

426. Al-Massarani, S.M., et al., *Phytochemical, antimicrobial and antiprotozoal evaluation of Garcinia mangostana pericarp and alpha-mangostin, its major xanthone derivative.* Molecules, 2013. 18(9): p. 10599-608.

427. Eukun Sage, E., et al., *From the Front or Back Door? Quantitative analysis of direct and indirect extractions of alpha-mangostin from mangosteen (Garcinia mangostana).* PLoS One, 2018. 13(10): p. e0205753.

428. Larsuprom, L., et al., *In vitro antibacterial activity of mangosteen (Garcinia mangostana Linn.) crude extract against Staphylococcus pseudintermedius isolates from canine pyoderma.* Vet Dermatol, 2019. 30(6): p. 487-e145.

429. Suksamrarn, S., et al., *Antimycobacterial activity of prenylated xanthones from the fruits of Garcinia mangostana.* Chem Pharm Bull (Tokyo), 2003. 51(7): p. 857-9.

430. Aisha, A.F., et al., *In vitro and in vivo anti-colon cancer effects of Garcinia mangostana xanthones extract.* BMC Complement Altern Med, 2012. 12: p. 104.

431. Dharmaratne, H.R., et al., *Antibacterial activity of xanthones from Garcinia mangostana (L.) and their structure-activity relationship studies.* Nat Prod Res, 2013. 27(10): p. 938-41.

432. Ee, G.C., et al., *Garcinia mangostana: a source of potential anti-cancer lead compounds against CEM-SS cell line.* J Asian Nat Prod Res, 2008. 10(5-6): p. 475-9.

433. Gopalakrishnan, G., B. Banumathi, and G. Suresh, *Evaluation of the antifungal activity of natural xanthones from Garcinia mangostana and their synthetic derivatives.* J Nat Prod, 1997. 60(5): p. 519-24.

434. Jung, H.A., et al., *Antioxidant xanthones from the pericarp of Garcinia mangostana (Mangosteen).* J Agric Food Chem, 2006. 54(6): p. 2077-82.

435. Mohammad, N.A., et al., *Optimization of the antioxidant-rich xanthone extract from mangosteen (Garcinia mangostana L.) pericarp via microwave-assisted extraction.* Heliyon, 2019. 5(10): p. e02571.

436. Sukatta, U., et al., *Distribution of major xanthones in the pericarp, aril, and yellow gum of mangosteen (Garcinia mangostana linn.) fruit and their contribution to antioxidative activity.* Biosci Biotechnol Biochem, 2013. 77(5): p. 984-7.

437. Wang, W., et al., *A novel xanthone dimer derivative with antibacterial activity isolated from the bark of Garcinia mangostana.* Nat Prod Res, 2018. 32(15): p. 1769-1774.

438. Zhao, Y., et al., *A new antioxidant xanthone from the pericarp of Garcinia mangostana Linn.* Nat Prod Res, 2010. 24(17): p. 1664-70.

439. Hafeez, B.B., et al., *alpha-Mangostin: a dietary antioxidant derived from the pericarp of Garcinia mangostana L. inhibits pancreatic tumor growth in xenograft mouse model.* Antioxid Redox Signal, 2014. 21(5): p. 682-99.

440. Lee, H.N., et al., *Antitumor and apoptosis-inducing effects of alpha-mangostin extracted from the pericarp of the mangosteen fruit (Garcinia mangostana L.)in YD-15 tongue mucoepidermoid carcinoma cells.* Int J Mol Med, 2016. 37(4): p. 939-48.

441. Mohan, S., et al., *An anti-inflammatory molecular mechanism of action of alpha-mangostin, the major xanthone from the pericarp of Garcinia mangostana: an in silico, in vitro and in vivo approach.* Food Funct, 2018. 9(7): p. 3860-3871.

442. Chang, H.F., C.H. Wu, and L.L. Yang, *Antitumour and free radical scavenging effects of gamma-mangostin isolated from Garcinia mangostana pericarps against hepatocellular carcinoma cell.* J Pharm Pharmacol, 2013. 65(9): p. 1419-28.

443. Fu, Y., et al., *Immune regulation and anti-inflammatory effects of isogarcinol extracted from Garcinia mangostana L. against collagen-induced arthritis.* J Agric Food Chem, 2014. 62(18): p. 4127-34.

444. Meepagala, K.M. and K.K. Schrader, *Antibacterial Activity of Constituents from Mangosteen Garcinia mangostana Fruit Pericarp against Several Channel Catfish Pathogens.* J Aquat Anim Health, 2018. 30(3): p. 179-184.

445. Wathoni, N., et al., *Characterization and antioxidant activity of pectin from Indonesian mangosteen (Garcinia mangostana L.) rind.* Heliyon, 2019. 5(8): p. e02299.

446. Pan-In, P., et al., *Cellular trafficking and anticancer activity of Garcinia mangostana extract-encapsulated polymeric nanoparticles.* Int J Nanomedicine, 2014. 9: p. 3677-86.

447. Garcia, M.L., et al., *Optimization of the antioxidant capacity of mangosteen peels (Garcinia mangostana L.) extracts: Management of the drying extraction processes.* Food Sci Technol Int, 2020: p. 1082013220962630.

448. Kondo, M., et al., *Bioavailability and antioxidant effects of a xanthone-rich Mangosteen (Garcinia mangostana) product in humans.* J Agric Food Chem, 2009. 57(19): p. 8788-92.

449. Tjahjani, S., Y. Biantoro, and R. Tjokropranoto, *Ethyl acetate Fraction of Garcinia Mangostana L Rind Study as Antimalaria and Antioxidant in Plasmodium berghei Inoculated Mice.* Open Access Maced J Med Sci, 2019. 7(12): p. 1935-1939.

450. Weecharangsan, W., et al., *Antioxidative and neuroprotective activities of extracts from the fruit hull of mangosteen (Garcinia mangostana Linn.).* Med Princ Pract, 2006. 15(4): p. 281-7.

451. Xie, Z., et al., *Functional beverage of Garcinia mangostana (mangosteen) enhances plasma antioxidant capacity in healthy adults.* Food Sci Nutr, 2015. 3(1): p. 32-8.

452. Ng, H.S., et al., *Surfactant as an Additive for the Recovery of Potent Antioxidants from Garcinia mangostana Pericarps Using a Polymer/Salt Aqueous Biphasic System.* Appl Biochem Biotechnol, 2020. 191(1): p. 273-283.

453. Ngawhirunpat, T., et al., *Antioxidant, free radical-scavenging activity and cytotoxicity of different solvent extracts and their phenolic constituents from the fruit hull of mangosteen (Garcinia mangostana).* Pharm Biol, 2010. 48(1): p. 55-62.

454. Lim, Y.K., et al., *Anti-inflammatory and in vitro bone formation effects of Garcinia mangostana L. and propolis extracts.* Food Sci Biotechnol, 2020. 29(4): p. 539-548.

455. Palakawong, C., et al., *Optimized extraction and characterization of antimicrobial phenolic compounds from mangosteen (Garcinia mangostana L.) cultivation and processing waste.* J Sci Food Agric, 2013. 93(15): p. 3792-800.

456. Chaijaroenkul, W., et al., *Proteomics analysis of antimalarial targets of Garcinia mangostana Linn.* Asian Pac J Trop Biomed, 2014. 4(7): p. 515-9.

457. Cunha, B.L., et al., *Evaluation of antimicrobial and antitumoral activity of Garcinia mangostana L. (mangosteen) grown in Southeast Brazil.* Acta Cir Bras, 2014. 29 Suppl 2: p. 21-8.

458. Narasimhan, S., et al., *Anti-Bacterial and Anti-Fungal Activity of Xanthones Obtained via Semi-Synthetic Modification of alpha-Mangostin from Garcinia mangostana.* Molecules, 2017. 22(2).

459. Tatiya-Aphiradee, N., W. Chatuphonprasert, and K. Jarukamjorn, *In vivo antibacterial activity of Garcinia mangostana pericarp extract against methicillin-resistant Staphylococcus aureus in a mouse superficial skin infection model.* Pharm Biol, 2016. 54(11): p. 2606-2615.

460. Janardhanan, S., et al., *Antimicrobial Effects of Garcinia Mangostana on Cariogenic Microorganisms.* J Clin Diagn Res, 2017. 11(1): p. ZC19-ZC22.

461. Oberholzer, I., et al., *Garcinia mangostana Linn displays antidepressant-like and pro-cognitive effects in a genetic animal model of depression: a bio-behavioral study in the Flinders Sensitive Line rat.* Metab Brain Dis, 2018. 33(2): p. 467-480.

462. Seesom, W., et al., *Antileptospiral activity of xanthones from Garcinia mangostana and synergy of gamma-mangostin with penicillin G.* BMC Complement Altern Med, 2013. 13: p. 182.

463. Tjahjani, S., *Antimalarial activity of Garcinia mangostana L rind and its synergistic effect with artemisinin in vitro.* BMC Complement Altern Med, 2017. 17(1): p. 131.

464. Wihastuti, T.A., et al., *Vasa vasorum anti-angiogenesis through H(2)O(2), HIF-1alpha, NF-kappaB, and iNOS inhibition by mangosteen pericarp ethanolic extract (Garcinia mangostana Linn) in hypercholesterol-diet-given Rattus norvegicus Wistar strain.* Vasc Health Risk Manag, 2014. 10: p. 523-31.

465. Manasathien, J., *EFFECTS OF MANGOSTEEN HULL EXTRACTS ON BIOEFFICACY AND ANTIPROLIFERATION OF HUMAN BREAST AND PROSTATE CARCINOMA CELL LINES.* Suranaree Journal of Science & Technology, 2017. 24(4).

466. Chayaburakul, K., et al., *Acute and subchronic oral toxicity of xanthones extracted from the pericarp of Garcinia mangostana Linn. in rat.* Asian Arch. Pathol., 2015. 11: p. 57-70.

467. Rahman, M.S., et al., *Rediscovery of Gonostegia Pentandra (Roxb.) Miq.(Urticaceae) from Bangladesh Sundarban.* Jahangirnagar University Journal of Biological Sciences, 2018. 7(2): p. 115-119.

468. Siriyong, T., et al., *Traditional Thai herbal medicine as an alternative treatment for refractory chronic eczema.* EXPLORE, 2020. 16(4): p. 242-249.

469. Li, T.S., *Taiwanese native medicinal plants: phytopharmacology and therapeutic values.* 2006.

470. Bhamarapravati, S., S. Pendland, and G. Mahady, *Extracts of spice and food plants from Thai traditional medicine inhibit the growth of the human carcinogen Helicobacter pylori.* In Vivo (Athens, Greece), 2003. 17(6): p. 541-544.

471. Klinthong, S., et al., *In vivo anti-inflammatory and in vitro antioxidant activities of a Thai traditional formula, Rid-si-duang-ma-ha-kan, for hemorrhoid treatment.* Mahidol Univ J Pharm Sci, 2015. 42(3): p. 144-152.

472. Goh, M.P.Y., et al., *Ethnobotanical review and pharmacological properties of selected medicinal plants in Brunei Darussalam: Litsea elliptica, Dillenia suffruticosa, Dillenia excelsa, Aidia racemosa, Vitex pinnata and Senna alata.* Asian Pacific Journal of Tropical Biomedicine, 2017. 7(2): p. 173-180.

473. Manosroi, A., et al., *Potent antiproliferative effect on liver cancer of medicinal plants selected from the Thai/Lanna medicinal plant recipe database "MANOSROI III".* Evidence-Based Complementary and Alternative Medicine, 2015. 2015.

474. Kummalue, T., et al., *Antiprolifrative Activities of Three Thai Medicinal Plants on Human Cancer Cells.* Siriraj Medical Journal, 2005. 57(11): p. 491-495.

475. Sarkar, C., et al., *Heliotropium indicum L.: From Farm to a Source of Bioactive Compounds with Therapeutic Activity.* Evidence-Based Complementary and Alternative Medicine, 2021. 2021.

476. Paul, S. and R. Kundu, *ROS mediated DNA damage and induction of apoptosis in cervical cancer cells by Heliotropium indicum L.* Journal of Applied Pharmaceutical Science, 2018. 8(08): p. 92-106.

477. Ghosh, P., et al., *Morphological characteristics and phyto-pharmacological detailing of Hatishur (Heliotropium indicum Linn.): A concise review.* Journal of Pharmacognosy and Phytochemistry, 2018. 7(5): p. 1900-1907.

478. Chunthorng-Orn, J., et al., *Cytotoxic, Anti-inflammatory and Antioxidant Activities of Heliotropium indicum Extracts.* Journal of the Medical Association of Thailand = Chotmaihet thangphaet, 2016. 99: p. S102-S109.

479. Satiraphan, M., *Phytochemical screening of two Thai tropical rainforest Dipterocarps: Hopea odorata Roxb. and Dipterocarpus costatus Gaertn. f*. 2012, Université René Descartes-Paris V; Silpakorn University. Faculty of Pharmacy ....

480. Kabir, M.S.H., et al., *Antioxidant, antidiarrheal, hypoglycemic and thrombolytic activities of organic and aqueous extracts of Hopea odorata leaves and in silico PASS prediction of its isolated compounds.* BMC complementary and alternative medicine, 2016. 16(1): p. 1-13.

481. Satiraphan, M., *Phytochemical study of hopea odorata roxb. and dipterocarpus costatus gaertn. f*. 2012, มหาวิทยาลัย ศิลปากร.

482. Kabir, M.S.H., et al., *Antibacterial activity of organic and aqueous extracts of Hopea odorata Roxb. leaves and their total flavonoid content.* British Microbiology Research Journal, 2015. 9(4): p. 1-7.

483. Nguyen, S.T., et al., *Hopea odorata extract inhibits hepatocellular carcinoma via induction of caspase-dependent apoptosis.* OncoTargets and therapy, 2017. 10: p. 5765.

484. Salleh, N.B., *Hopea odorata Roxb.(Dipterocarpaceae).* Malaysia Biodiversity Information System (MyBIS), 2018.

485. Kumar, D., et al., *Ethnobotanical and pharmacological review on Indigofera tinctoria.* International Research Journal of Pharmaceutical and Applied Sciences, 2020. 10(1): p. 1-6.

486. Hossain, A.M., et al., *Isolation and selection of Bradyrhizobium from the root nodules of indigo plants (Indigofera tinctoria L.).* African Journal of Biotechnology, 2012. 11(58): p. 12183-12191.

487. Renukadevi, K. and S.S. Sultana, *Determination of antibacterial, antioxidant and cytotoxicity effect of Indigofera tinctoria on lung cancer cell line NCI-h69.* Int J Pharmacol, 2011. 7(3): p. 356-362.

488. Singh, R., S. Sharma, and V. Sharma, *Comparative and quantitative analysis of antioxidant and scavenging potential of Indigofera tinctoria Linn. extracts.* Journal of Integrative Medicine, 2015. 13(4): p. 269-278.

489. Alluri, K., et al., *Assessment of Bioactivity of Indian Medicinal Plants Using Brine Shrimp (Artemia salina) Lethality Assay.* Int J Appl Sci Eng, 2004. 2.

490. Magesh, V., G.Y.M. Deecaraman, and P. Kalaichelvan, *Methanolic extract of Indigofera tinctoria induces apoptosis in HCT116 cells.* Journal of Applied Biosciences, 2009. 14: p. 768-774.

491. Manvar, M.N. and T. Desai, *Phytochemical and pharmacological profile of Ipomoea aquatica.* Indian journal of medical sciences, 2013. 67.

492. Bokolo, B. and E. Adikwu, *Ethanolic leaf extract of Ipomoea aquatica Forsk abrogates cisplatin-induced kidney damage in albino rats.* Journal of Nephropharmacology, 2018. 8(1): p. e02-e02.

493. Manvar, M.N., *Antibacterial activity of leaves and flowers of Ipomoea aquatica forsk.(Convolvulacea).* Asian Journal of Pharmaceutical Research, 2018. 8(2): p. 94-98.

494. Lawal, U., et al., *Antioxidant and [alpha]-Glucosidase Inhibitory Activities of Isolated Compounds from Ipomoea aquatica.* Records of Natural Products, 2016. 10(6): p. 701.

495. Bhalodi, M., S. Shukla, and A. Saluja, *PHCOG MAG.: Research Article In-vitro Antioxidant activity of the flowers of Ipomoea aquatica Forsk.*

496. Dhanasekaran, S., P. Perumal, and M. Palayan, *In-vitro Screening for acetylcholinesterase enzyme inhibition potential and antioxidant activity of extracts of Ipomoea aquatica Forsk: therapeutic lead for Alzheimer's disease.* J. Appl. Pharm. Sci, 2015. 5: p. 012-016.

497. Umar, K., et al., *Comparative study of antioxidant activities of the leaves and stem of Ipomoea aquatica Forsk (Water Spinach).* Nigerian Journal of Basic and Applied Sciences, 2015. 23(1): p. 81-84.

498. James, O., et al., *INVITRO AND INVIVO STUDIES ON THE ANTIOXIDATIVE ACTIVITIES, MEMBRANE STABILIZATION AND CYTOTOXICITY OF WATER SPINACH (Ipomoea aquatica Forsk) FROM IBAJI PONDS, NIGERIA.* Inter J. of PharmTech Res, 2009. 1(3): p. 474-482.

499. Khayungarnnawee, A., et al., *Cardiovascular Effects of the Ethanolic Extract of Ipomoea Aquatica Forsk. in Rat.* TJPS, 2018. 42(2018).

500. M, S., S. Ramachandran, and S. Mohan, *MTT Assay on Anticancer Properties of Phytoconstituents from Ipomoea aquatica forsskal using MCF-7 cell lines for breast cancer in Women.* Research Journal of Pharmacy and Technology, 2020. 13: p. 1356.

501. Jacoeb, A.M. and S. Purwaningsih, *Deskripsi Mikroskopis dan Kandungan Mineral Tanaman Kangkung Air (Ipomoea aquatica Forsk.).*

502. Umoh, O.T. and M.E. Bassey, *Morphology and distribution of species of the family Cucurbitaceae in Akwa Ibom State, Nigeria.* Phytotaxa, 2021. 508(2): p. 107–128-107–128.

503. Ghule, B.V., et al., *Antihyperlipidemic effect of the methanolic extract from Lagenaria siceraria Stand. fruit in hyperlipidemic rats.* J Ethnopharmacol, 2009. 124(2): p. 333-7.

504. Patel, S.B., U.A. Attar, and S. Ghane, *Antioxidant potential of wild Lagenaria siceraria (Molina) Standl.* Thai Journal of Pharmaceutical Sciences (TJPS), 2018. 42(2).

505. Kalsait, R.P., et al., *Isolation of phytosterols and antihyperlipidemic activity of Lagenaria siceraria.* Arch Pharm Res, 2011. 34(10): p. 1599-604.

506. Attar, U.A. and S.G. Ghane, *In vitro antioxidant, antidiabetic, antiacetylcholine esterase, anticancer activities and RP-HPLC analysis of phenolics from the wild bottle gourd (Lagenaria siceraria (Molina) Standl.).* South African Journal of Botany, 2019. 125: p. 360-370.

507. Mayakrishnan, V., et al., *Free radical scavenging potential of Lagenaria siceraria (Molina) Standl fruits extract.* Asian Pacific Journal of Tropical Medicine, 2013. 6(1): p. 20-26.

508. Ullah, M.O., et al., *Anti–bacterial activity and brine shrimp lethality bioassay of methanolic extracts of fourteen different edible vegetables from Bangladesh.* Asian Pacific journal of tropical biomedicine, 2013. 3(1): p. 1-7.

509. Shendge, P.N. and S. Belemkar, *Acute and 28-day oral toxicity studies of methanolic extract of Lagenaria siceraria (Cucurbitaceae) fruit in rats.* Drug and Chemical toxicology, 2021. 44(5): p. 493-501.

510. Kulju, K.K.M., S.E.C. Sierra, and P.C. Welzen, *Re-shaping Mallotus [Part 2]: inclusion of Neotrewia, Octospermum and Trewia in Mallotus s.s. (Euphorbiaceae s.s.).* Blumea - Biodiversity, Evolution and Biogeography of Plants, 2007. 52: p. 115-136.

511. Shilpi, J.A., A.I. Gray, and V. Seidel, *New cardenolides from the stem bark of Trewia nudiflora.* Fitoterapia, 2010. 81(6): p. 536-539.

512. Smith, M.A., et al., *Characterization of novel triacylglycerol estolides from the seed oil of Mallotus philippensis and Trewia nudiflora.* Lipids, 2013. 48(1): p. 75-85.

513. Chaity, A., et al., *Antibacterial Efficacy of the Methanol Extract of Fruits of Trewia nudiflora Linn. (Euphorbiaceae).* 2020. 3: p. 38-43.

514. Barua, K.N., et al., *Variation of fatty oil content in different populations of Mallotus nudiflorus (L.) Kulju & Welzen occurring in diverse agro climatic zones of Assam.* Journal of Medicinal Plants, 2022. 10(3): p. 30-35.

515. Begum, Y., *Antibacterial, Antioxidant and Cytotoxic activities of Trewia nudiflora.* PharmaTutor, 2016. 4(1): p. 37-41.

516. Rani, S. and K. Rahman, *Molsari (Mimusops elengi Linn.): A boon drug of traditional medicine.* International Journal of Pharmaceutical Sciences and Research, 2017. 8(1): p. 17.

517. Baliga, M.S., et al., *Chemistry and medicinal properties of the Bakul (Mimusops elengi Linn): A review.* Food Research International, 2011. 44(7): p. 1823-1829.

518. Kadam, P.V., et al., *Mimusops elengi: A review on ethnobotany, phytochemical and pharmacological profile.* Journal of Pharmacognosy and Phytochemistry, 2012. 1(3).

519. Nasrin, M., P. Dash, and M.R. Saha, *In vitro Anthelmintic and Cytotoxic Activities of Methanolic Bark Extract of Mimusops elengi Linn.* Stamford Journal of Pharmaceutical Sciences, 2010. 3: p. 20-24.

520. Zahid, H., et al., *Antiinflammatory and antioxidant activities of Mimusops elengiL.* L. Br J Pharm Res, 2016. 9(3): p. 1-10.

521. Karuppusamy, M., et al., *Mimusops Elengi Linn Plant Extract as an Efficient Green Corrosion Inhibitor for Mild Steel in Acidic Environment.* 2015. 4.

522. de Oliveira, M.S., et al., *Phytochemical profile and biological activities of Momordica charantia L.(Cucurbitaceae): A review.* African Journal of Biotechnology, 2018. 17(27): p. 829-846.

523. Parra, A.L., et al., *Antidiabetic, hypolipidemic, antioxidant and anti-inflammatory effects of Momordica charantia L. foliage extract.* Journal of Pharmacy & Pharmacognosy Research, 2021. 9(4): p. 537-548.

524. Rahmawati, R., H. Widiastuti, and E. Sulistya, *In Vitro Anti-Inflammatory Assay of Bitter Melon (Momordica charantia L.) Ethanol Extract.* Jurnal Fitofarmaka Indonesia, 2020. 7(3): p. 1-4.

525. Kharima, F.N. and R. Yuliani, *Aktivitas Sitotoksik Ekstrak Etanol Buah Pare (Momordica charantia L.) Terhadap Sel Kanker MCF-7 dan T47D*. 2019, Universitas Muhammadiyah Surakarta.

526. Purushoth Prabhu, T., et al., *In vitro anticancer activity of ethanolic extract of pericarp and seed parts of Momordica charantia on colon cancer cell lines.* Journal of Pharmacognosy and Phytochemistry, 2021. 10(3): p. 224-229.

527. Lestari, P. and P.G.M.W. Mahayasih, *Inhibition activity of angiotensin converting enzyme (ACE) and determination of total phenolic and flavonoid compound from bitter melon leaves (Momordica charantia L.).* Pharmacognosy Journal, 2017. 9(2).

528. Maneenin, C., et al., *Antioxidant capacity of Momordica charantia extract and its protective effect on testicular damage in valproic acid-induced rats.* Int J Morphol, 2018. 36(2): p. 447-453.

529. Tamilanban, T., *In vitro neuroprotective effect of charantin from Momordica charantia against neurotoxin and endoplasmic reticulum stress-induced cell death in SH-SY5Y cells.* International Journal of Green Pharmacy (IJGP), 2018. 12(03).

530. Yoshime, Luciana & Pereira de Melo, Illana & Gasparotto Sattler, José & Carvalho, Eliane & Filho, Jorge. (2016). Bitter gourd (Momordica charantia L.) seed oil as a naturally rich source of bioactive compounds for nutraceutical purposes. Nutrire. 41. 10.1186/s41110-016-0013-y.

531. Ogbonna, O., et al., *Phytochemical compositions of fruits of three Musa species at three stages of development.* IOSR Journal of Pharmacy and Biological Sciences, 2016. 11(3): p. 48-59.

532. Molina-Salinas, G.M., et al., *Bactericidal effect of the leaf extract from musa spp.(AAB group, silk subgroup), cv.“manzano” against multidrug-resistant mycobacterium tuberculosis.* Journal of medicinal food, 2019. 22(11): p. 1183-1185.

533. Samsun Nahar, M., et al., *Asian Journal of Pharmacognosy.* Asian Journal of Pharmacognosy, 2017. 1(4): p. 31-34.

534. Kibria, A.A., et al., *Extraction and evaluation of phytochemicals from banana peels (Musa sapientum) and banana plants (Musa paradisiaca).* substance, 2019. 10: p. 13.

535. Vilhena, R.d.O., et al., *Morpho-anatomy of the inflorescence of Musax paradisiaca.* Revista Brasileira de Farmacognosia, 2019. 29: p. 147-151.

536. Al-Mqbali, L.R.A. and M.A. Hossain, *Cytotoxic and antimicrobial potential of different varieties of ripe banana used traditionally to treat ulcers.* Toxicology reports, 2019. 6: p. 1086-1090.

537. Thomas, A. and K. Krishnakumar, *Banana peel: pharmacological activities: a Review.* International Journal of Innovative research and advanced studies, 2017. 4(5): p. 62-4.

538. Dahham, S.S., et al., *Antioxidant activities and anticancer screening of extracts from banana fruit (Musa sapientum).* Academic Journal of Cancer Research, 2015. 8(2): p. 28-34.

539. Goodies, M.E., et al., *Anti-ulcerogenic Activity of Aqueous Extract of Unripe Fruit of Musa sapientum Linn in Combination with Vitamin C on Ulcer Induced Models in Experimental Rats.* European Journal of Medicinal Plants, 2017: p. 1-6.

540. Imam, M.Z. and S. Akter, *Musa paradisiaca L. and Musa sapientum L. : A Phytochemical and Pharmacological Review.* Journal of Applied Pharmaceutical Science, 2011. 01.

541. Imam, M.Z. and S. Akter, *Musa paradisiaca l. and musa sapientum l. : A phytochemical and pharmacological review.* journal of applied pharmaceutical science, 2011. 1: p. 14-20.

542. Asuquo, E.G. and C.E. Udobi, *Antibacterial and toxicity studies of the ethanol extract of Musa paradisiaca leaf.* Cogent Biology, 2016. 2(1): p. 1219248.

543. Kappel, V.D., et al., *Beneficial effects of banana leaves (Musa x paradisiaca) on glucose homeostasis: multiple sites of action.* Revista Brasileira de Farmacognosia, 2013. 23(4): p. 706-715.

544. Acharya, J., S. Karak, and B. De, *Metabolite profile and bioactivity of Musa X paradisiaca L. flower extracts.* Journal of Food Biochemistry, 2016. 40(6): p. 724-730.

545. Rao, N.M., S. Prasad, and N. Jyothirmayi, *Efficacy of ripened and unripened fruit extracts of Musa X paradisiaca L.(Bontha cultivar) against human pathogens.* International Journal of Pharmacy and Pharmaceutical Sciences, 2012. 4(1): p. 455-460.

546. Shawa, I., et al., *Brine shrimp lethality and phytochemical determination of aqueous extracts of Senna singueana , Musa paradisiaca , and Ziziphus mucronata in Malawi.* Journal of Basic and Applied Research, 2015. 1: p. 82-88.

547. Ariffin, M.M., et al., *In vitro antibacterial, antioxidant, and cytotoxicity evaluations of Musa paradisiaca cv. Sekaki florets from Sarawak, Malaysia.* Journal of Applied Pharmaceutical Science, 2021. 11.

548. Ugbogu, E.A., et al., *Toxicological profile of the aqueous-fermented extract of Musa paradisiaca in rats.* Avicenna Journal of Phytomedicine, 2018. 8(6): p. 478.

549. Latha, P., et al., *Pharmacology and chemistry of Myristica fragrans Houtt.-a review.* Journal of Spices and Aromatic Crops, 2005. 14(2): p. 94-101.

550. Ha, M.T., et al., *Phytochemical and pharmacological properties of Myristica fragrans Houtt.: an updated review.* Archives of Pharmacal Research, 2020. 43(11): p. 1067-1092.

551. Olaleye, M., C. Akinmoladun, and A. Akindahunsi, *Antioxidant properties of Myristica fragrans (Houtt) and its effect on selected organs of albino rats.* African Journal of Biotechnology, 2006. 5(15).

552. Gupta, A.D., et al., *Chemistry, antioxidant and antimicrobial potential of nutmeg (Myristica fragrans Houtt).* Journal of Genetic engineering and Biotechnology, 2013. 11(1): p. 25-31.

553. Pillai, S., R. Mahmud, and S. Ismail, *Studies on the Phytochemical Properties and Brine Shrimp Toxicity of Essential Oil Extracted from Myristica fragrans Houtt. (Nutmeg).* Journal of essential oil-bearing plants JEOP, 2012. 15: p. 53-57.

554. Chirathaworn, C., et al., *Myristica fragrans Houtt. methanolic extract induces apoptosis in a human leukemia cell line through SIRT1 mRNA downregulation.* Journal of the Medical Association of Thailand = Chotmaihet thangphaet, 2007. 90: p. 2422-8.

555. Hayfaa, A.A.-S., A.M.A.-S. Sahar, and M.A.-S. Awatif, *Evaluation of analgesic activity and toxicity of alkaloids in Myristica fragrans seeds in mice.* Journal of pain research, 2013. 6: p. 611.

556. *Polyphenols and its source C. terminalis (L.) kunth and Myristica fragrans Houtt*. 2015.

557. Al-Lahham, S., et al., *Antioxidant, antimicrobial and cytotoxic properties of four different extracts derived from the roots of Nicotiana tabacum L.* European Journal of Integrative Medicine, 2020. 33: p. 101039.

558. He, X.-F., et al., *Two new cembranic diterpenoids from the flowers of Nicotiana tabacum L.* Phytochemistry Letters, 2016. 15: p. 238-244.

559. Frega, N., et al., *Chemical composition of tobacco seeds (Nicotiana tabacum L.).* Journal of the American Oil Chemists Society, 1991. 68(1): p. 29-33.

560. Anumudu, C., et al., *Antimicrobial activities of extracts of tobacco leaf (Nicotiana tabacum) and its grounded snuff (utaba) on Candida albicans and Streptococcus pyogenes.* J Trop Dis, 2019. 7(300): p. 2.

561. Subba, B. and S. Thapa, *Analysis of phytoconstituents and biological activities on the selected medicinal plants of Dolakha and Sindhualchowk district of Nepal.* Journal of Institute of Science and Technology, 2018. 22(2): p. 140-147.

562. Kusumawardani, B., et al., *Cytotoxic Potential of Flavonoid from Nicotiana tabacum Leaves on MCF-7 Human Breast Cancer Cells.* Indonesian Journal of Cancer Chemoprevention, 2020. 11(2): p. 97-102.

563. Andjani, H., et al. *Acute oral toxicity test of nicotiana tabacum L. Bio-oil against female winstar rats*. in *IOP Conference Series: Earth and Environmental Science*. 2019. IOP Publishing.

564. Qin, M., et al., *Genome-Wide Analysis of the G2-Like Transcription Factor Genes and Their Expression in Different Senescence Stages of Tobacco (Nicotiana tabacum L.).* Frontiers in Genetics, 2021. 12(787).

565. Schachtsiek, J. and F. Stehle, *Nicotine-free, nontransgenic tobacco (Nicotiana tabacum L.) edited by CRISPR-Cas9.* Plant Biotechnology Journal, 2019.

566. Makmur, K., T. CHIKMAWATI, and S. SOBIR, *Genetic variability of lemon basil (Ocimum× africanum Lour.) from Indonesian archipelago based on morphological and inter-simple sequence repeats markers.* Biodiversitas Journal of Biological Diversity, 2020. 21(12).

567. Pisutthanan, N. and S. Pisutthanan, *Variability of essential oil constituents of Ocimum africanum.* Naresuan University Journal: Science and Technology (NUJST), 2013. 17(3): p. 269-274.

568. Limanan, D., E. Yulianti, and F. Ferdinal. *Phytochemical Screening, Total Antioxidant Capacity, and Toxicity Test of Basil Leaf Extract (Ocimum x africanum Lour)*. in *1st Tarumanagara International Conference on Medicine and Health (TICMIH 2021)*. 2021. Atlantis Press.

569. Ashish, K., et al., *Intercropping and mixed herb distillation for high-quality oil yield using lemon-scented basil (Ocimum africanum Lour.) cv. CIM-Jyoti and lemongrass (Cymbopogon flexuous (Nees ex Steud.) cv. Krishna.* Acta Ecologica Sinica, 2021.

570. Lal, R., et al., *Registration of high citral rich essential oil yielding variety-CIM Jyoti of Ocimum africanum.* Journal of Medicinal and Aromatic Plant Sciences 2017a, 2017. 39(2-4): p. 135-138.

571. Nadeem, H.R., et al., *Toxicity, Antioxidant Activity, and Phytochemicals of Basil (Ocimum basilicum L.) Leaves Cultivated in Southern Punjab, Pakistan.* Foods, 2022. 11(9): p. 1239.

572. Kathirvel, P. and R. Subban, *Chemical composition of the essential oil from basil (Ocimum basilicum Linn.) and its in vitro cytotoxicity against HeLa and HEp-2 human cancer cell lines and NIH 3T3 mouse embryonic fibroblasts.* Natural product research, 2011. 26: p. 1112-8.

573. Rasekh, H.R., et al., *Safety assessment of Ocimum basilicum hydroalcoholic extract in wistar rats: acute and subchronic toxicity studies.* Iranian journal of basic medical sciences, 2012. 15(1): p. 645.

574. Ilyas, U., D.P. Katare, and V. Aeri, *ETHANOMEDICINAL, PHYTOCHEMICAL AND PHARMACOLOGICAL INVESTIGATION OF OCIMUM TENUIFLORUM LINN.*

575. Rahmawati, F. and H. Silaban, *Bioactivity of Kemangi Leaves (Ocimum sanctum) and Ruku Leaves (Ocimum tenuiflorum).* International Journal of Health Sciences and Research, 2021. 11(5): p. 379-391.

576. Bhattacharya, S., *Medicinal plants and natural products in amelioration of arsenic toxicity: a short review.* Pharmaceutical Biology, 2017. 55(1): p. 349-354.

577. Gupta, R.K., D. Kumari, and A.K. Saxena, *Antiproliferative and Antioxidant effect of Ocimum tenuiflorum leaves extract on Breast cancer cell lines: In vitro study.* Annals of the Romanian Society for Cell Biology, 2021. 25(6): p. 6433-6442.

578. Hinaz, N. and R. Geetha, *Anticarcinogenic effect of Ocimum tenuiflorum on oral cancer cell lines.* Drug Invention Today, 2018. 10.

579. Lam, S., G. Neda, and M. Rabeta, *The anticancer effect of Ocimum tenuiflorum leaves.* Food Research, 2018. 2(2): p. 154-162.

580. Khan, I., et al., *Evaluation of antileishmanial, antibacterial and brine shrimp cytotoxic potential of crude methanolic extract of Herb Ocimum basilicum (Lamiacea).* Journal of Traditional Chinese Medicine, 2015. 35(3): p. 316-322.

581. Salleh, R.M., *Toxicology assessment of Ocimum tenuiflorum L. leaves extracts on streptozotocin-induced diabetic rats.* Malaysian Journal of Microscopy, 2018. 14(1).

582. Revathi, J., et al., *In vitro propagation, in vitro flowering, ex vitro root regeneration and foliar micro-morphological analysis of Hedyotis biflora (Linn.) Lam.* Vegetos, 2019. 32(4): p. 609-619.

583. Ding, X., D. Bai, and J. Qian, *Novel cyclotides from Hedyotis biflora inhibit proliferation and migration of pancreatic cancer cell in vitro and in vivo.* Medicinal Chemistry Research, 2014. 23(3): p. 1406-1413.

584. Wong, C.T., et al., *Optimal oxidative folding of the novel antimicrobial cyclotide from Hedyotis biflora requires high alcohol concentrations.* Biochemistry, 2011. 50(33): p. 7275-7283.

585. Purba, R. and P. Paengkoum, *Bioanalytical HPLC method of Piper Betle L. for quantifying phenolic compound, water-soluble vitamin, and essential oil in five different solvent extracts.* Journal of Applied Pharmaceutical Science, 2019. 9: p. 033-039.

586. Kudva, A.K., et al., *Piper betle Linn. in Cancer: Past, Present, and Future*, in *Anticancer plants: Properties and Application: Volume 1*, M.S. Akhtar and M.K. Swamy, Editors. 2018, Springer Singapore: Singapore. p. 327-347.

587. Ghosh, K. and T.K. Bhattacharya, *Chemical constituents of Piper betle Linn. (Piperaceae) roots.* Molecules (Basel, Switzerland), 2005. 10(7): p. 798-802.

588. Nerdy, N., et al., *Brine Shrimp (Artemia salina Leach.) Lethality Test of Ethanolic Extract from Green Betel (Piper betle Linn.) and Red Betel (Piper crocatum Ruiz and Pav.) through the Soxhletation Method for Cytotoxicity Test.* Open Access Macedonian Journal of Medical Sciences, 2021. 9(A): p. 407-412.

589. Rungrojsakul, M., *Cytotoxic and antiproliferative effects of crude ethanolic extract from Piper betle leaves on leukemic cell lines.* Journal of Associated Medical Sciences, 2021.

590. Dosoky, N.S., et al., *Volatiles of black pepper fruits (Piper nigrum L.).* Molecules, 2019. 24(23): p. 4244.

591. Sriwiriyajan, S., et al., *Anticancer and Cancer Prevention Effects of Piperine-Free Piper nigrum Extract on N-nitrosomethylurea-Induced Mammary Tumorigenesis in Rats.* Cancer Prev Res (Phila), 2016. 9(1): p. 74-82.

592. Gulcin, I., *The antioxidant and radical scavenging activities of black pepper (Piper nigrum) seeds.* Int J Food Sci Nutr, 2005. 56(7): p. 491-9.

593. Tan, L.Y., W.F. Yin, and K.G. Chan, *Piper nigrum, Piper betle and Gnetum gnemon--natural food sources with anti-quorum sensing properties.* Sensors (Basel), 2013. 13(3): p. 3975-85.

594. Ee, G.C., et al., *Pellitorine, a potential anti-cancer lead compound against HL6 and MCT-7 cell lines and microbial transformation of piperine from Piper Nigrum.* Molecules, 2010. 15(4): p. 2398-404.

595. Hritcu, L., et al., *Anxiolytic and antidepressant profile of the methanolic extract of Piper nigrum fruits in beta-amyloid (1-42) rat model of Alzheimer's disease.* Behav Brain Funct, 2015. 11: p. 13.

596. Kapoor, I.P., et al., *Chemistry and in vitro antioxidant activity of volatile oil and oleoresins of black pepper (Piper nigrum).* J Agric Food Chem, 2009. 57(12): p. 5358-64.

597. Majdalawieh, A.F. and R.I. Carr, *In vitro investigation of the potential immunomodulatory and anti-cancer activities of black pepper (Piper nigrum) and cardamom (Elettaria cardamomum).* J Med Food, 2010. 13(2): p. 371-81.

598. Turrini, E., P. Sestili, and C. Fimognari, *Overview of the Anticancer Potential of the "King of Spices" Piper nigrum and Its Main Constituent Piperine.* Toxins (Basel), 2020. 12(12).

599. Tu, Y., et al., *Anticholinesterases and antioxidant alkamides from Piper nigrum fruits.* Nat Prod Res, 2016. 30(17): p. 1945-9.

600. Vijayakumar, R.S. and N. Nalini, *Efficacy of piperine, an alkaloidal constituent from Piper nigrum on erythrocyte antioxidant status in high fat diet and antithyroid drug induced hyperlipidemic rats.* Cell Biochem Funct, 2006. 24(6): p. 491-8.

601. Alqarni, M.H., et al., *Combining Normal/Reversed-Phase HPTLC with Univariate Calibration for the Piperine Quantification with Traditional and Ultrasound-Assisted Extracts of Various Food Spices of Piper nigrum L. under Green Analytical Chemistry Viewpoint.* Molecules, 2021. 26(3).

602. Ngo, Q.M., et al., *Alkaloids from Piper nigrum Exhibit Antiinflammatory Activity via Activating the Nrf2/HO-1 Pathway.* Phytother Res, 2017. 31(4): p. 663-670.

603. Pei, H., et al., *Alkaloids from Black Pepper (Piper nigrum L.) Exhibit Anti-Inflammatory Activity in Murine Macrophages by Inhibiting Activation of NF-kappaB Pathway.* J Agric Food Chem, 2020. 68(8): p. 2406-2417.

604. Umadevi, P., et al., *Proteomics assisted profiling of antimicrobial peptide signatures from black pepper (Piper nigrum L.).* Physiol Mol Biol Plants, 2018. 24(3): p. 379-387.

605. Abukawsar, M.M., et al., *Chemical, pharmacological and nutritional quality assessment of black pepper (Piper nigrum L.) seed cultivars.* Journal of Food Biochemistry, 2018. 42(6): p. e12590.

606. Banerjee, D., et al., *Muscodor albus MOW12 an Endophyte of Piper nigrum L. (Piperaceae) Collected from North East India Produces Volatile Antimicrobials.* Indian J Microbiol, 2014. 54(1): p. 27-32.

607. Das, N., *Propagation prospects of dye yielding plant, Rhinacanthus nasutus (Linn.) Kurz.* 2006.

608. Bulugahapitiya, V.P., P. Fernando, and H. Jayasekara, *Anti-oxidant, pediculicidal and pesticidal activities of leaves of Rhinacanthus nasutus (Linn) grown in Sri Lanka.* Asian Journal of Medical and Biological Research, 2020. 6(4): p. 754-760.

609. Jayapriya, G., *Phytochemical analysis and antimicrobial efficacy of Rhinacanthus nasutus (l) Linn.* Journal of Pharmacognosy and Phytochemistry, 2015. 3(6).

610. Ngoc, T.M., et al., *A new naphthoquinone analogue and antiviral constituents from the root of Rhinacanthus nasutus.* Natural product research, 2019. 33(3): p. 360-366.

611. Kaffoor, A., A. Venkatachalapathi, and K. Arumugasamy, *IN VITRO ANTIOXIDANT ACTIVITY OF AQUEOUS AND ETHANOL LEAF EXTRACTS OF RHINACANTHUS NASUTUS (LINN.) KURZ.(ACANTHACEAE).* Kongunadu Research Journal, 2018. 5(2): p. 53-55.

612. Shah, M.A., J.E. Keach, and P. Panichayupakaranant, *Antidiabetic naphthoquinones and their plant resources in Thailand.* Chemical and Pharmaceutical Bulletin, 2018. 66(5): p. 483-492.

613. Thongchuai, B., et al., *Anti-herpes simplex virus type 2 activity from Rhinacanthus nasutus (Linn.) Kurz. extracts as affected by different extraction solvents.* Nat. Sci, 2019. 18: p. 14-26.

614. Boonyaketgoson, S., et al., *Naphthoquinones from the leaves of Rhinacanthus nasutus having acetylcholinesterase inhibitory and cytotoxic activities.* Fitoterapia, 2018. 124: p. 206-210.

615. Mohammed, M. and Z. Hamza, *Physicochemical properties of oil extracts from Sesamum Indicum L. seeds grown in Jigawa State–Nigeria.* Journal of Applied Sciences and Environmental Management, 2008. 12(2).

616. Xu, H. and Y. Wen, *In vitro antitumour activity of Sesamum indicum Linn flower extracts.* Tropical Journal of Pharmaceutical Research, 2010. 9(5).

617. Hilmi, Y. *A Study of antioxidant activity, enzymatic inhibition and in vitro cytotoxicity of selected traditional Sudanese plants with anti-diabetic potential*. in *Qatar Foundation Annual Research Forum Volume 2013 Issue 1*. 2013. Hamad bin Khalifa University Press (HBKU Press).

618. Hassan, M.A., *Studies on Egyptian sesame seeds (Sesamum indicum L.) and its products 1-physicochemical analysis and phenolic acids of roasted Egyptian sesame seeds (Sesamum indicum L.).* World Journal of Dairy & Food Sciences, 2012. 7(2): p. 195-201.

619. Kumar, P.S., J. Patel, and M. Saraf, *Mechanism of vasorelaxant activity of a fraction of root extract of Sesamum indicum Linn.* 2008.

620. FLAX, A.O.I., *SYNERGISTIC ANTI-INFLAMMATORY AND ANTIOXIDANT ACTIVITIES OF INDIAN FLAX AND SESAME SEED LIGNANS.*

621. Kiran, K. and M. Asad, *Wound healing activity of Sesamum indicum L seed and oil in rats.* 2008.

622. Srisayam, M., et al., *Antioxidant, antimelanogenic, and skin-protective effect of sesamol.* J cosmet Sci, 2014. 65(2): p. 69-79.

623. Nivethitha, R., et al., *In Vitro Anticancer Effect of Sesamum Indicum Extract.* Journal of Complementary Medicine Research, 2020. 11(5): p. 99-105.

624. Yusuf, M., et al., *Determination of median lethal dose of ethanolic extract of Sesamum Indicum seeds in adult wistar rats.* African Journal of Cellular Pathology, 2017. 9(2): p. 73-76.

625. Hsu, D.-Z., P.-Y. Chu, and M.-Y. Liu, *Extracts of sesame (Sesamum indicum L.) seeds and gastric mucosal cytoprotection*, in *Nuts and Seeds in Health and Disease Prevention*. 2011, Elsevier. p. 1019-1027.

626. Sam, H.V., K. Nanthavong, and P.J.A. Kessler, *Trees of Laos and Vietnam: A Field Guide to 100 Economically or Ecologically Important Species.* Blumea - Biodiversity, Evolution and Biogeography of Plants, 2004. 49: p. 201-349.

627. Salbitano, F., L. Bernasconi, and G. Calamini, *Seed and seedling ecology of Shorea siamensis and Shorea obtusa in the dry dipterocarp forest of Huai Kha Khaeng (Thailand)*. 2001, Curtin University of Technology: Bentley. p. 52-61.

628. Tancharoen, C., *Experimental and Theoretical Studies on Resveratrol Oligomer Compounds from the Bark of Dipterocarpacease Family Against HIV-1 Reverse Transcriptase*. 2012, Kasetsart University.

629. *Shorea siamensis Miq.* .

630. Naujeer, H.B., *Morphological diversity in eggplant (Solanum melongena L.), their related species and wild types conserved at the National gene bank in Mauritius.* 2009.

631. Yang, B.-Y., et al., *Terpenes and lignans from the roots of Solanum melongena L.* Natural product research, 2020. 34(3): p. 359-368.

632. Croitoru, C., et al., *Eggplant Peels as a Valuable Source of Anthocyanins: Extraction, Thermal Stability and Biological Activities.* Plants, 2021. 10(3): p. 577.

633. Diatta, K., et al., *Study of Antioxidant Activity of Stalk and Fruit of Solanum melongena L.(Solanaceae).* Asian Journal of Research in Medical and Pharmaceutical Sciences, 2019: p. 1-7.

634. Liu, Y., et al., *A New Phenylpropanoid from the Roots of Solanum melongena L. and Evaluation of Anti-inflammatory Activity.* Records of Natural Products, 2021. 15(4): p. 261-266.

635. Salama, M. and S.M. Ezzat, *In vitro and in vivo anticancer activity of the fruit peels of Solanum melongena L. against hepatocellular carcinoma.* 2013.

636. Chouaibi, M., et al., *Influence of drying processes on bioactive compounds profiles, hydroxymethylfurfural, color parameters, and antioxidant activities of Tunisian eggplant (Solanum melongena L.).* Journal of Food Processing and Preservation, 2021: p. e15460.

637. Sultana, R. and M. Misbahuddin, *Effects of solasodine of Solanum melongena peel origin in the treatment of palmar arsenical keratosis.* Bangabandhu Sheikh Mujib Medical University Journal, 2020. 13(2): p. 47-52.

638. Wahab, A.A., et al., *Effects of aqueous extract of Solanum melongena on blood system of wistar rats.* World Journal of Life Sciences and Medical Research, 2012. 2(5): p. 159.

639. Sujarwo, W. and A.P. Keim, *Spondias pinnata (Lf) Kurz. Anacardiaceae*, in *Ethnobotany of the Mountain Regions of Southeast Asia*. 2021, Springer. p. 1009-1014.

640. Sai, K., et al., *Evaluation of the Hypoglycemic Potential of Leaves Extract of Spondias pinnata (Lf) Kurz. from Nepal.* The Scientific World Journal, 2021. 2021.

641. Hafiz, M., *Preliminary Phytochemical Screening, Antioxidant Activity & Cytotoxic Activity Evaluation of Spondias pinnata Barks*. 2014, East West University.

642. Ahlam, A.A., et al., *Spondias pinnata (lf) Kurz leaf extract derived zinc oxide nanoparticles induce dual modes of apoptotic-necrotic death in HCT 116 and K562 cells.* Biological Trace Element Research, 2021. 199(5): p. 1778-1801.

643. Attanayake, A.P., *Toxicological investigation of Spondias pinnata (Linn. F.) Kurz.(Family: Anacardiaceae) bark extract in Wistar rats.* International Journal of Green Pharmacy (IJGP), 2015. 9(1): p. 26-31.

644. Sujarwo, W. and A.P. Keim, *Chapter 27 - Spondias pinnata (L. f.) Kurz. (Anacardiaceae): Profiles and Applications to Diabetes*, in *Bioactive Food as Dietary Interventions for Diabetes (Second Edition)*, R.R. Watson and V.R. Preedy, Editors. 2019, Academic Press. p. 395-405.

645. Kaur, K. and S. Kaushal, *Phytochemistry and pharmacological aspects of Syzygium aromaticum: A review.* J. Pharmacogn. Phytochem, 2019. 8: p. 398-406.

646. Selles, S.M.A., et al., *Chemical composition, in-vitro antibacterial and antioxidant activities of Syzygium aromaticum essential oil.* Journal of Food Measurement and Characterization, 2020. 14: p. 2352-2358.

647. Prashar, A., I.C. Locke, and C.S. Evans, *Cytotoxicity of clove (Syzygium aromaticum) oil and its major components to human skin cells.* Cell Prolif, 2006. 39(4): p. 241-8.

648. Koba, K., et al., *Antibacterial activities of the buds essential oil of Syzygium aromaticum (L.) Merr. & Perry from Togo.* Journal of Biologically Active Products from Nature, 2011. 1(1): p. 42-51.

649. Maggi, M.D., et al., *Laboratory evaluations of Syzygium aromaticum (L.) Merr. et Perry essential oil against Varroa destructor.* Journal of Essential Oil Research, 2010. 22(2): p. 119-122.

650. Boughendjioua, H., *Essential Oil Composition of Syzygium aromaticum (L.).* International Research Journal of Pharmacy and Medical Sciences (IRJPMS), 2018. 1(3): p. 26-28.

651. Yassin, M.T., et al., *Bioactivity of Syzygium aromaticum (L.) Merr. & LM Perry extracts as potential antimicrobial and anticancer agents.* Journal of King Saud University-Science, 2020. 32(8): p. 3273-3278.

652. Afanyibo, Y., et al., *Toxicity and antioxidant activity of Syzygium aromaticum, Mondia whitei, Carissa spinarum and Caesalpinia bonduc.* The Journal of Phytopharmacology, 2019. 8(3): p. 124-128.

653. Krishnaraju, A.V., et al., *Biological screening of medicinal plants collected from Eastern Ghats of India using Artemia salina (brine shrimp test).* International Journal of Applied Science and Engineering, 2006. 4(2): p. 115-125.

654. Vijayasteltar, L., et al., *Safety assessment of a standardized polyphenolic extract of clove buds: Subchronic toxicity and mutagenicity studies.* Toxicology Reports, 2016. 3: p. 439-449.

655. Baser, K.H.C., *Karanfil (Syzigium aromaticum (L.) Merr. et Perry.* BagBahce, 2014: p. 26-27.

656. Komakech, R., et al., *Anti-inflammatory and analgesic potential of Tamarindus indica Linn. (Fabaceae): a narrative review.* Integr Med Res, 2019. 8(3): p. 181-186.

657. Ushanandini, S., et al., *The anti-snake venom properties of Tamarindus indica (leguminosae) seed extract.* Phytother Res, 2006. 20(10): p. 851-8.

658. Krishna, R.N., R. Anitha, and D. Ezhilarasan, *Aqueous extract of Tamarindus indica fruit pulp exhibits antihyperglycaemic activity.* Avicenna J Phytomed, 2020. 10(5): p. 440-447.

659. Nwodo, U.U., et al., *Effects of fractionation and combinatorial evaluation of Tamarindus indica fractions for antibacterial activity.* Molecules, 2011. 16(6): p. 4818-27.

660. Guneidy, R.A., et al., *Antioxidant or pro-oxidant and glutathione transferase P1-1 inhibiting activities for Tamarindus indica seeds and their cytotoxic effect on MCF-7 cancer cell line.* J Genet Eng Biotechnol, 2020. 18(1): p. 74.

661. Amir, M., et al., *Ameliorating effects of Tamarindus indica fruit extract on anti-tubercular drugs induced liver toxicity in rats.* Nat Prod Res, 2016. 30(6): p. 715-9.

662. Aravind, S.R., et al., *Antitumor and immunopotentiating activity of polysaccharide PST001 isolated from the seed kernel of Tamarindus indica: an in vivo study in mice.* ScientificWorldJournal, 2012. 2012: p. 361382.

663. Azman, K.F., et al., *Antiobesity effect of Tamarindus indica L. pulp aqueous extract in high-fat diet-induced obese rats.* J Nat Med, 2012. 66(2): p. 333-42.

664. Bhadoriya, S.S., et al., *Anti-Inflammatory and Antinociceptive Activities of a Hydroethanolic Extract of Tamarindus indica Leaves.* Sci Pharm, 2012. 80(3): p. 685-700.

665. Escalona-Arranz, J.C., et al., *Antioxidant and toxicological evaluation of a Tamarindus indica L. leaf fluid extract.* Nat Prod Res, 2016. 30(4): p. 456-9.

666. Razali, N., et al., *Investigation into the effects of antioxidant-rich extract of Tamarindus indica leaf on antioxidant enzyme activities, oxidative stress and gene expression profiles in HepG2 cells.* PeerJ, 2015. 3: p. e1292.

667. Natukunda, S., J.H. Muyonga, and I.M. Mukisa, *Effect of tamarind (Tamarindus indica L.) seed on antioxidant activity, phytocompounds, physicochemical characteristics, and sensory acceptability of enriched cookies and mango juice.* Food Sci Nutr, 2016. 4(4): p. 494-507.

668. Lim, C.Y., et al., *In vivo biochemical and gene expression analyses of the antioxidant activities and hypocholesterolaemic properties of Tamarindus indica fruit pulp extract.* PLoS One, 2013. 8(7): p. e70058.

669. Nwodo, U.U., et al., *Assessment of Tamarindus indica extracts for antibacterial activity.* Int J Mol Sci, 2011. 12(10): p. 6385-96.

670. Hasan, M., S. Rahman, and M. Akhter, *Antibacterial and cytotoxic activity of Tamarindus indica (Tamarind) seeds.* Journal of Bio-Science, 2019. 27: p. 83-88.

671. Nwodo, U.U., et al., *Acute toxicity and hepatotoxicokinetic studies of Tamarindus indica extract.* Molecules, 2011. 16(9): p. 7415-7427.

672. Chimsah, F., G. Nyarko, and A. Abubakari, *A review of explored uses and study of nutritional potential of tamarind (Tamarindus indica L.) in Northern Ghana.* 2020.

673. Komakech, R., et al., *Anti-inflammatory and analgesic potential of Tamarindus indica Linn. (Fabaceae): a narrative review.* Integrative Medicine Research, 2019. 8(3): p. 181-186.

674. Nutmakul, T., *Phytochemical and pharmacological activity of Tiliacora triandra (Colebr.) Diels.* Songklanakarin Journal of Science & Technology, 2021. 43(5).

675. Thong-Asa, W., et al., *Tiliacora triandra (Colebr.) Diels leaf extract enhances spatial learning and learning flexibility, and prevents dentate gyrus neuronal damage induced by cerebral ischemia/reperfusion injury in mice.* Avicenna journal of phytomedicine, 2017. 7(5): p. 389-400.

676. Chaveerach, et al. *Chemical Constituents , Antioxidant Property , Cytotoxicity and Genotoxicity of Tiliacora*. 2016.

677. Sireeratawong, S., et al., *Acute and subchronic toxicity study of the water extract from Tiliacora triandra (Colebr.) Diels in rats.* Songklanakarin Journal of Science & Technology, 2008. 30(5).

678. Ohashi, H. and Y. Iokawa, *A Revision of Uraria (Leguminosae) in Taiwan.* Taiwania, 2007. 52(2): p. 177-183.

679. Tu, P.-C., et al., *Bioactivity-guided fractionation and NMR-based identification of the immunomodulatory isoflavone from the roots of Uraria crinita (L.) Desv. ex DC.* Foods, 2019. 8(11): p. 543.

680. De Boer, H.J., C. Vongsombath, and J. Käfer, *A fly in the ointment: evaluation of traditional use of plants to repel and kill blowfly larvae in fermented fish.* Plos one, 2011. 6(12): p. e29521.

681. Manochai, B., et al., *Antioxidant activity and total volatile oil content of cassumunar ginger (Zingiber montanum Roxb.) at various rhizome ages.* Food Science and Biotechnology, 2007. 16(2): p. 290-293.

682. Hassan, M., et al., *Zerumbone and Kaempferol Derivatives from the Rhizomes of Zingiber montanum (J. Koenig) Link ex A. Dietr. from Bangladesh.* Separations, 2019. 6(2): p. 31.

683. Sharma, G., P. Chirangini, and K. Mishra, *Evaluation of antioxidant and cytotoxic properties of tropical ginger, Zingiber montanum (J. Konig) A Dietr.* Gardens' Bull Singapore, 2007. 59(1): p. 189-202.

684. Taechowisan, T., S. Suttichokthanakorn, and W.S. Phutdhawong, *Antibacterial and cytotoxicity activities of phenylbutanoids from Zingiber cassumunar Roxb.* Journal of Applied Pharmaceutical Science, 2018. 8(7): p. 121-127.

685. Koontongkaew, S., et al., *Safety evaluation of Zingiber cassumunar Roxb. rhizome extract: acute and chronic toxicity studies in rats.* International Scholarly Research Notices, 2014. 2014.

686. Devkota, H.P., et al., *Bioactive Compounds from Zingiber montanum and Their Pharmacological Activities with Focus on Zerumbone.* Applied Sciences, 2021. 11(21): p. 10205.

687. Saising, J., et al., *Ethnomedicinal Plants in Herbal Remedies Used for Treatment of Skin Diseases by Traditional Healers in Songkhla Province, Thailand.* Plants, 2022. 11(7): p. 880.

688. Mughal, S.B., et al., *Ethnobotanical literature survey of plants used to cure skin diseases.* World Appl Sci J, 2013. 27(4): p. 474-478.

689. Tundis, R., et al., *Potential role of natural compounds against skin aging.* Current medicinal chemistry, 2015. 22(12): p. 1515-1538.

690. Athar, M. and S.M. Nasir, *Taxonomic perspective of plant species yielding vegetable oils used in cosmetics and skin care products.* African journal of biotechnology, 2005. 4(1): p. 36-44.

691. Pupala, S.S., et al., *Topical application of coconut oil to the skin of preterm infants: a systematic review.* European Journal of Pediatrics, 2019. 178(9): p. 1317-1324.

692. Vala, G. and P. Kapadiya, *Medicinal benefits of coconut oil.* Int J Life Sci Res, 2014. 2(4): p. 124-126.

693. Chew, Y.-L., *The beneficial properties of virgin coconut oil in management of atopic dermatitis.* Pharmacognosy Reviews, 2019. 13(25): p. 24.

694. HOE, T.K., *The current scenario and development of the coconut industry.* 2018.

695. Papu, S., et al., *Medicinal values of garlic (Allium sativum L.) in human life: an overview.* Greener Journal of Agricultural Sciences, 2014. 4(6): p. 265-280.

696. Tesfaye, A. and W. Mengesha, *Traditional uses, phytochemistry and pharmacological properties of garlic (Allium Sativum) and its biological active compounds.* Int. J. Sci. Res. Eng. Technol, 2015. 1: p. 142-148.

697. Ballabh B, Chaurasia O. *Traditional medicinal plants of cold desert Ladakh—Used in treatment of cold, cough and fever*. Journal of ethnopharmacology. 2007;112(2):341-9.

698. Darbandi MP, Taheri J. *Using sulfur-containing minerals in medicine: Iranian traditional documents and modern pharmaceutical terminology*. Earth Sciences History. 2018;37(1):25-33.

C.O. Perera, and B. Fedrizzi, *Centella asiatica (Gotu kola) as a neuroprotectant and its potential role in healthy ageing.* Trends in Food Science & Technology, 2018. 79: p. 88-97.

261. Kang, N.J., et al., *Cinnamomum camphora Leaves Alleviate Allergic Skin Inflammatory Responses In Vitro and In Vivo.* Toxicol Res, 2019. 35(3): p. 279-285.

262. Xiao, S., et al., *The anti-inflammatory potential of Cinnamomum camphora (L.) J. Presl essential oil in vitro and in vivo.* Journal of Ethnopharmacology, 2021. 267: p. 113516.

263. Li, Y.-R., et al., *Investigation of constituents from Cinnamomum camphora (L.) J. Presl and evaluation of their anti-inflammatory properties in lipopolysaccharide-stimulated RAW 264.7 macrophages.* Journal of ethnopharmacology, 2018. 221: p. 37-47.

264. Wagan, T.A., et al., *Evaluation of the chemical composition and bioactivity of essential oils from Cinnamomum camphora (L.) J. Presl.(Lauraceae), Piper nigrum L.(Piperaceae) and Stemona japonica (Miq.)(Stemonaceae) against Oryzaephilus surinamensis (Linnaeus, 1758)(Coleoptera: Silvanidae).* Polish Journal of Entomology, 2019. 88(3): p. 199-213.

265. Batiha, G.E.-S., et al., *Syzygium aromaticum L.(Myrtaceae): Traditional uses, bioactive chemical constituents, pharmacological and toxicological activities.* Biomolecules, 2020. 10(2).

266. Yang, H., et al., *Anti-Tyrosinase and Antioxidant Activity of Proanthocyanidins From Cinnamomum Camphora.* 2021.

267. Satyal, P., et al., *Bioactivities and compositional analyses of Cinnamomum essential oils from Nepal: C. camphora, C. tamala, and C. glaucescens.* Natural product communications, 2013. 8(12): p. 1934578X1300801232.

268. Wang, J., W. Zhang, and H. Huang, *'Yongjin','Xiaguang'and 'Yuhuang': Three Ornamental Cultivars of Cinnamomum camphora.* HortScience, 2015. 50(5): p. 762-764.

269. *Orwa C, Mutua A , Kindt R , Jamnadass R, Simons A. 2009. Agroforestree Database:a tree reference and selection guide*

version 4.0

270. Singh, N., et al., *Phytochemical and pharmacological review of Cinnamomum verum J. Presl-a versatile spice used in food and nutrition.* Food Chemistry, 2021. 338: p. 127773.

271. Sharifi-Rad, J., et al., *Cinnamomum Species: Bridging Phytochemistry Knowledge, Pharmacological Properties and Toxicological Safety for Health Benefits.* Frontiers in pharmacology, 2021. 12: p. 600139-600139.

272. Kankeaw, U. and E. Masong, *The antioxidant activity from hydroquinone derivatives by the synthesis of Cinnamomium verum J. Presl Bark's extracted.* International Journal of Chemical Engineering and Applications, 2015. 6(2): p. 91.

273. Muthiah, M., *Evaluation of Brine Shrimp Lethality of Cinnamomum Species.* Ethnobotanical Leaflets, 2008. 12.

274. Yang, S.-m., et al., *Molecular mechanism of Cinnamomum verum component cuminaldehyde inhibits cell growth and induces cell death in human lung squamous cell carcinoma NCI-H520 cells in vitro and in vivo.* Journal of Cancer, 2016. 7(3): p. 251.

275. Yaradua, I., et al., *Phytochemical Screening, Acute (LD50) and Sub-Chronic Toxicity Studies of Aqueous Stem Bark Extract of Cinnamomum Verum.* 2018.

276. Costa, R., et al., *Antimicrobial activity and chemical composition of Citrus aurantifolia (Christm.) Swingle essential oil from Italian organic crops.* Journal of Essential Oil Research, 2014. 26(6): p. 400-408.

277. Lin, L.Y., et al., *Lime (Citrus aurantifolia (Christm.) Swingle) Essential Oils: Volatile Compounds, Antioxidant Capacity, and Hypolipidemic Effect.* Foods, 2019. 8(9).

278. Ajaiyeoba, E., et al., *Radical scavenging and cytotoxicity evaluation of eight extracts of Citrus limon and Citrus aurantifolia.* Nigerian Journal of Natural Products and Medicine, 2016. 20: p. 121-127.

279. Enejoh, O.S., et al., *Ethnomedical importance of Citrus aurantifolia (christm) swingle.* The Pharma Innovation, 2015. 4(8, Part A): p. 1.

280. Karthikeyan, V., *Citrus aurantium (Bitter Orange): A Review of its Traditional Uses, Phytochemistry and Pharmacology.* INTERNATIONAL JOURNAL OF DRUG DISCOVERY AND HERBAL RESEARCH (IJDDHR), 2014. 4: p. 766-772.

281. Poomirat, S., et al., *Cytotoxicity against Cervical and Breast Cancer Cells of Leard-Ngam Remedy and Its Plant Compositions.* Science & Technology Asia, 2020: p. 38-50.

282. Tijjani, M.A., et al., *Phytochemical Screening, Acute Toxicity and Anti-Nociceptive Activity of Methanol Stem Bark Extract of Citrus aurantifolia Linn.*

283. Mazraie, M.A., et al., *Spread and colonization pattern of 'Candidatus Phytoplasma aurantifolia' in lime plants [Citrus aurantifolia (Christm.) Swingle] as revealed by real-time PCR assay.* Journal of Plant Pathology, 2019. 101(3): p. 629-637.

284. Munankarmi, N.N., et al., *Characterization of the Genetic Diversity of Acid Lime (Citrus aurantifolia (Christm.) Swingle) Cultivars of Eastern Nepal Using Inter-Simple Sequence Repeat Markers.* Plants-Basel, 2018. 7(2).

285. Anuchapreeda, S., et al., *Isolation and biological activity of agrostophillinol from kaffir lime (Citrus hystrix) leaves.* Bioorganic & Medicinal Chemistry Letters, 2020. 30(14): p. 127256.

286. Agouillal, F., et al., *A Review of Genetic Taxonomy, Biomolecules Chemistry and Bioactivities of Citrus Hystrix DC.* Biosciences Biotechnology Research Asia, 2017. 14(1): p. 285.

287. Masruri, M., et al. *The effect of kaffir lime (Citrus hystrix DC) essential oil on bioplastic derived from cassava peel waste*. in *Journal of Physics: Conference Series*. 2019. IOP Publishing.

288. Sreepian, A., et al., *Antibacterial activity of essential oil extracted from Citrus hystrix (Kaffir Lime) peels: An in vitro study.* Tropical Biomedicine, 2019. 36(2): p. 531-541.

289. Chueahongthong, F., et al., *Cytotoxic effects of crude kaffir lime (Citrus hystrix, DC.) leaf fractional extracts on leukemic cell lines.* Journal of Medicinal Plants Research, 2011. 5(14): p. 3097-3105.

290. Raksakantong, P., S. Siriamornpun, and N. Meeso, *Effect of drying methods on volatile compounds, fatty acids and antioxidant property of Thai kaffir lime (Citrus hystrix DC).* International journal of food science & technology, 2012. 47(3): p. 603-612.

291. Chowdhury, A., et al., *Antimicrobial, antioxidant and cytotoxic activities of Citrus hystrix DC. fruits.* Dhaka University Journal of Pharmaceutical Sciences, 2009. 8(2): p. 177-180.

292. Wijayanti, N., W. Tunjung, and Y. Setyawati, *Cytotoxicity and apoptosis induction by kaffir lime leaves extract (Citrus hystrix DC.) in HeLa cells culture (human cervical cancer cell line).* KnE Life Sciences, 2015: p. 631-631.

293. Tunjung, W.A.S., et al., *Evaluation of Anticancer Bioactive Compounds and Cytotoxicity of Kaffir Lime (Citrus hystrix Dc.) Callus Extract Post Preservation.* Indonesian Journal of Pharmacy, 2021: p. 179-192.

294. Ningombam, D., et al., *Phytochemical, Antimicrobial and Acute Toxicity Studies on Methanolic Extracts of Citrus medica L. and Citrus hystrix DC Fruits.* 2021.

295. Sedeek, M.S., et al., *Botanical and genetic characterization of Citrus maxima (BURM.) Merrill. F. Rutaceae.* Int J Pharm Pharm Sci, 2017. 9(1): p. 260-72.

296. Reshmi, S., et al., *Identification of bioactive compound from Citrus maxima fruit against carbohydrate-hydrolysing enzymes.* Current Science (00113891), 2018. 114(10).

297. Ali, M., et al., *Antioxidant potential, subacute toxicity, and beneficiary effects of methanolic extract of pomelo (Citrus grandis L. Osbeck) in long evan rats.* Journal of toxicology, 2019. 2019.

298. Khan, N.H., C. Qian, and N. Perveen, *Phytochemical screening, antimicrobial and antioxidant activity determination of citrus maxima peel.* Pharmacy & Pharmacology International Journal, 2018. 6(4): p. 279-285.

299. Wang, F., et al., *On higher nutritional and medical properties of a carotenoid-rich mutant pomelo (Citrus maxima (L.) Osbeck).* Industrial Crops and Products, 2019. 127: p. 142-147.

300. Matsuo, Y., et al., *Comparison of Antioxidant Properties of Different Crude Extracts from Citrus natsudaidai Peel.* Food Science and Technology Research, 2020. 26(6): p. 837-846.

301. Tsai, W.-C. and Y.-H. Wong, ***α**-Glucosidase Inhibitory Activity and Antioxidant Activity of Pomelo (Citrus grandis) Peel, Albedo, and Flavedo Extracts.* Taiwanese Journal of Agricultural Chemistry & Food Science, 2019. 57(4).

302. Islam, A., et al., *In Vitro Antioxidant and In Vivo Antidiabetic Properties of Citrus Maxima Leaf Extracts in Alloxan-Induced Swiss Albino Diabetic Mice.* Asian Food Sci J, 2021: p. 66-79.

303. Lin, L.-Y., et al., *Pomelo fruit wastes are potentially valuable antioxidants, anti-inflammatories, antihypertensives, and antihyperglycemics.* Horticulture, Environment, and Biotechnology, 2021. 62(3): p. 377-395.

304. Haida, Z. and M. Hakiman, *A review of therapeutic potentials of Clinacanthus nutans as source for alternative medicines.* Sains Malaysiana, 2019. 48(12): p. 2683-2691.

305. Chuah, P.N., et al., *Comparative conventional extraction methods of ethanolic extracts of Clinacanthus nutans leaves on antioxidant activity and toxicity.* British Food Journal, 2020.

306. Febriansah, R. and I.A. Dewayanti. *Chemopreventive Activity of Clinacanthus nutans L. Ethyl Acetate Fraction on Breast Cancer Cells Line*. in *4th International Conference on Sustainable Innovation 2020–Health Science and Nursing (ICoSIHSN 2020)*. 2021. Atlantis Press.

307. Fong, S.Y., *Genetic, phytochemical and bioactivity studies of Clinacanthus nutans (Burm. f.) Lindau (Acanthaceae).* RMIT University, 2015.

308. Chahal, K., et al., *Chemical composition and biological activity of Coriandrum sativum L.: A review.* Indian Journal of Natural Products and Resources (IJNPR)[Formerly Natural Product Radiance (NPR)], 2018. 8(3): p. 193-203.

309. Munasinghe, M., et al., *Blood sugar lowering effect of Coccinia grandis (L.) J. Voigt: path for a new drug for diabetes mellitus.* Experimental diabetes research, 2011. 2011.

310. Pulbutr, P., et al., *Research Article In vitro α-amylase and α-glucosidase Inhibitory Activities of Coccinia grandis Aqueous Leaf and Stem Extracts.* 2017.

311. Ramachandran, A., R. Prasath, and A. Anand, *The medical uses of Coccinia grandis L. Voigt: a review.* International journal of pharmacognosy, 2015. 69(7): p. 1-6.

312. Doka, I.G., S. El Tigani, and S. Yagi, *Amino acid content, fatty acid profile and radical scavenging capacities of Coccinia grandis (L.) Voigt. fruits.* Advance Journal of Food Science and Technology, 2014. 6(12): p. 1307-1312.

313. Pramanik, A., et al., *Coccinia grandis (L.) Voigt leaf extract exhibits antileishmanial effect through pro-inflammatory response: An in vitro study.* Current microbiology, 2017. 74(1): p. 59-67.

314. Umamaheswari, M. and T. Chatterjee, *In vitro antioxidant activities of the fractions of Coccinia grandis L. leaf extract.* African Journal of Traditional, Complementary and Alternative Medicines, 2008. 5(1): p. 61-73.

315. al-Mamun, M., et al., *Brine shrimp toxicity study of different Bangladeshi medicinal plants.* Advances in Natural and Applied Sciences, 2010. 4(2): p. 163-173.

316. Alamgir, A. and M. Rahman, *Phytochemical Characteristics, Antimitotic, Cytotoxic and Antiinflamatory Activities of Coccinia grandis (L.) J. Voigt.* Alamgir ANM, Rahman M and Rahman A, 2014: p. 218-225.

317. Lahiry, S., et al., *Ethanolic leaf extract of Coccinia grandis is effective against both drug resistant and drug sensitive clinical isolates of Indian Kala-azar.* Journal of Parasitic Diseases, 2018. 42(3): p. 433-441.

318. Kundu, M., R. Mazumder, and M. Kushwaha, *Evaluation of hepatoprotective activity of ethanol extract of Coccinia grandis (L.) Voigt. leaves on experimental rats by acute and chronic models.* Oriental Pharmacy and Experimental Medicine, 2012. 12(2): p. 93-97.

319. Lima, E.B.C., et al., *Cocos nucifera (L.) (Arecaceae): A phytochemical and pharmacological review.* Brazilian Journal of Medical and Biological Research, 2015. 48(11): p. 953-964.

320. *Medicinal Benefits of Coconut Oil.*

321. Intahphuak, S., P. Khonsung, and A. Panthong, *Anti-inflammatory, analgesic, and antipyretic activities of virgin coconut oil.* Pharmaceutical Biology, 2010. 48(2): p. 151-157.

322. Adebayo, J.O., et al., *Antimalarial Activity of Cocos nucifera Husk Fibre: Further Studies.* Evid Based Complement Alternat Med, 2013. 2013: p. 742476.

323. Kalina, S. and S.B. Navaratne, *Analysis of Antioxidant Activity and Texture Profile of Tender-Young and King Coconut (Cocos nucifera) Mesocarps under Different Treatments and the Possibility to Develop a Food Product.* Int J Food Sci, 2019. 2019: p. 7470696.

324. Koschek, P.R., et al., *The husk fiber of Cocos nucifera L. (Palmae) is a source of anti-neoplastic activity.* Braz J Med Biol Res, 2007. 40(10): p. 1339-43.

325. Akter, S., et al., *Pharmacological effect of methanolic and hydro-alcoholic extract of Coconut endocarp.* J. Adv. Biotechnol. Exp. Ther, 2020. 3: p. 171-181.

326. NasimunIslam, N., et al., *Cytotoxic Property of Cocos nucifera shell Extracts on HeLa Cells.* Research Journal of Pharmacy and Technology, 2014. 7(5): p. 521.

327. George, V., et al., *Cocos nucifera L. inflorescence extract: An effective hepatoprotective agent.* Indian Journal of Traditional Knowledge (IJTK), 2019. 19(1): p. 128-136.

328. Gordon, A. and J. Jackson, *Case study: application of appropriate technologies to improve the quality and safety of coconut water*, in *Food Safety and Quality Systems in Developing Countries*. 2017, Elsevier. p. 185-216.

329. Sudhakar, P., et al., *Colocasia esculenta (L.) Schott: Pharmacognostic and pharmacological review.* Phytopathology, 2020. 9: p. 1382-1386.

330. Krishnapriya, T. and A. Suganthi, *Biochemical and phytochemical analysis of Colocasia esculenta (L.) Schott tubers.* International Journal of Research in Pharmacy and Pharmaceutical Sciences, 2017. 2(3): p. 21-25.

331. Oriyomi, V.O., et al., *Biotoxicity of Colocasia esculenta [Linn.]: Involvement of Colocasia esculenta leaf in preservation of staple from Sitophilus zeamais [Motschulsky] attack.* Industrial Crops and Products, 2022. 182: p. 114897.

332. Jyothi, R., *Cytotoxic potentiality of Colocasia esculenta leaves extract on five different cancer cell lines using 3-(4, 5-Dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide assay.* International Journal of Green Pharmacy (IJGP), 2020. 14(4).

333. Azubike, N., et al., *Subacute toxicity profile of the leaves of Colocasia esculenta [L. Schott] in albino rats.* Research Journal of Medicinal Plants [Internet], 2016. 1: p. 10.

334. Sriti, J., et al., *Chemical composition and antioxidant activities of Tunisian and Canadian coriander (Coriandrum sativum L.) fruit.* Journal of Essential Oil Research, 2011. 23(4): p. 7-15.

335. Sharopov, F., et al., *Chemical composition and anti-proliferative activity of the essential oil of Coriandrum sativum L.* Am. J. Essent. Oils Nat. Prod, 2017. 5: p. 11-15.

336. Sriti, J., et al., *Antioxidant properties and polyphenol contents of different parts of coriander (Coriandrum sativum L.) fruit.* La Rivista Italiana Delle Sostanze Grasse, 2012. 49: p. 253-262.

337. Demir, S. and M. Korukluoglu, *A comparative study about antioxidant activity and phenolic composition of cumin (Cuminum cyminum L.) and coriander (Coriandrum sativum L.).* Indian Journal of Traditional Knowledge (IJTK), 2020. 19(2): p. 383-393.

338. Dutta, S., et al., *Antioxidant and free radical scavenging activity of Trigonella foenum-graecum L, Murraya koenigii, Coriandrum sativum and Centella asiatica.* Turkish Journal of Agriculture-Food Science and Technology, 2016. 4(4): p. 255-261.

339. Jeya, K., M. Veerapagu, and V. Sangeetha, *Antimicrobial and antioxidant properties of Coriandrum sativum L. seed essential oil.* American Journal of Essential Oils and Natural Products, 2019. 7(2): p. 06-10.

340. Elmas, L., et al., *The determination of the potential anticancer effects of Coriandrum sativum in PC-3 and LNCaP prostate cancer cell lines.* Journal of cellular biochemistry, 2019. 120(3): p. 3506-3513.

341. Kačániová, M., et al., *Antioxidant, antimicrobial and antibiofilm activity of coriander (Coriandrum sativum L.) essential oil for its application in foods.* Foods, 2020. 9(3): p. 282.

342. Fayyad, G., et al., *Evaluation of biological activities of seeds of Coriandrum sativum.* International Journal of Scientific and Engineering Research, 2017. 8(7): p. 1058-1063.

343. Dharamatti, V., *Cultivation of Coriander (Coriandrum sativum L.): A Review Article.* International Journal of Pure & Applied Bioscience, 2017. 5: p. 796-802.

344. Belal, A.A., F.B. Ahmed, and L.I. Ali, *Antibacterial activity of Cuminum cyminum L. oil on six types of bacteria.* American Journal of BioScience, 2017. 5(4): p. 70-73.

345. Ghasemi, G., et al., *Antioxidant and antifungal activities of a new chemovar of cumin (Cuminum cyminum L.).* Food science and biotechnology, 2019. 28(3): p. 669-677.

346. Sun, Y., et al., *Antifungal activity and action mode of cuminic acid from the seeds of Cuminum cyminum L. against Fusarium oxysporum f. sp. niveum (FON) causing Fusarium wilt on watermelon.* Molecules, 2017. 22(12): p. 2053.

347. Goodarzi, S., et al., *Cuminum cyminum fruits as source of luteolin-7-O-glucoside, potent cytotoxic flavonoid against breast cancer cell lines.* Natural product research, 2020. 34(11): p. 1602-1606.

348. Abbaszadegan, A., et al., *Antimicrobial and cytotoxic activity of Cuminum cyminum as an intracanal medicament compared to chlorhexidine gel.* Iranian endodontic journal, 2016. 11(1): p. 44.

349. Dinparvar, S., et al., *A nanotechnology-based new approach in the treatment of breast cancer: Biosynthesized silver nanoparticles using Cuminum cyminum L. seed extract.* Journal of Photochemistry and Photobiology B: Biology, 2020. 208: p. 111902.

350. Haddad, B., et al., *Organ toxicity and estrogen like effects of cuminum cyminum. l seed essential oil: a hormonal, histopathological and immunohistochemical study in female mice.* J. Pharm. Sci, 2018. 4: p. 1-11.

351. Singh, N., et al., *A review on traditional uses, phytochemistry, pharmacology, and clinical research of dietary spice Cuminum cyminum L.* Phytotherapy Research, 2021. 35(9): p. 5007-5030.

352. Verma, R.K., et al., *Medicinal properties of turmeric (Curcuma longa L.): A review.* Int. J. Chem. Stud, 2018. 6(4): p. 1354-1357.

353. Kukula-Koch, W., et al., *Superior anticancer activity is demonstrated by total extract of Curcuma longa L. as opposed to individual curcuminoids separated by centrifugal partition chromatography.* Phytotherapy Research, 2018. 32(5): p. 933-942.

354. Rezvanirad, A., et al., *Curcuma longa: A review of therapeutic effects in traditional and modern medical references.* Journal of Chemical and Pharmaceutical Sciences, 2016. 9(4): p. 3438-3448.

355. Murugan, S., et al., *Safety Evaluation of Standardized Extract of Curcuma longa (NR-INF-02): A 90-Day Subchronic Oral Toxicity Study in Rats.* BioMed Research International, 2021. 2021.

356. Niranjan, A. and D. Prakash, *Chemical constituents and biological activities of turmeric (Curcuma longa l.)-a review.* Journal of Food Science and Technology, 2008. 45(2): p. 109.

357. Gofir, A., et al., *The effect of Centella asiatica L. Urban. and Curcuma longa L. extracts combination in improving memory performance in stroke model rats and its acute toxicity.* Indonesian Journal of Pharmacology and Therapy. 2(2).

358. Hosseini, A. and H. Hosseinzadeh, *Antidotal or protective effects of Curcuma longa (turmeric) and its active ingredient, curcumin, against natural and chemical toxicities: A review.* Biomedicine & pharmacotherapy, 2018. 99: p. 411-421.

359. Toda, S., et al., *Natural antioxidants. III. Antioxidative components isolated from rhizome of Curcuma longa L.* Chemical and Pharmaceutical Bulletin, 1985. 33(4): p. 1725-1728.

360. Sharma, K.R. and R. Kharel, *Antibacterial, Antidiabetic and Brine Shrimp Lethality Activities of Some Selected Medicinal Plants from Kavrepalanchok District of Nepal.* Journal of Institute of Science and Technology, 2019. 24(1): p. 57-62.

361. Abdel-Lateef, E., et al., *Bioactive chemical constituents of Curcuma longa L. rhizomes extract inhibit the growth of human hepatoma cell line (HepG2).* Acta Pharmaceutica, 2016. 66(3): p. 387-398.

362. Habtemariam, S., *Chapter 20 - The chemical and pharmacological basis of turmeric (Curcuma longa L.) as potential therapy for type 2 diabetes and metabolic syndrome*, in *Medicinal Foods as Potential Therapies for Type-2 Diabetes and Associated Diseases*, S. Habtemariam, Editor. 2019, Academic Press. p. 751-789.

363. Ogu, G.I., et al., *Antimicrobial and phytochemical evaluation of the leaf, stem bark and root extracts of Cyathula prostrata (L) Blume against some human pathogens.* Journal of Complementary Medicine Research, 2012. 1(1): p. 35-43.

364. Abdallah, E.M., *Antibacterial potential of fresh fruit juices against multi-drug resistant pathogens.* Journal of Acute Disease, 2020. 9(2): p. 83.

365. Richard, D.K., et al., *Ethanol-induced gastric ulceration in rats: Protective roles of methanol and water extracts of Cyathula prostrata Linn Blume.* Journal of Pharmacognosy and Phytochemistry, 2017. 6(5): p. 1515-1517.

366. Sowemimo, A., et al., *Cytotoxic activity of selected Nigerian plants.* African Journal of Traditional, Complementary and Alternative Medicines, 2009. 6(4).

367. Schnablegger, G., et al., *Cyathula prostrata ethanol extract activates the extrinsic pathway of apoptosis in HeLa and U937 cell lines.* South African Journal of Botany, 2013. 88: p. 380-387.

368. Ogbonnia, S., et al., *Evaluation of acute toxicity and hypoglycaemic and hypolipidaemic effects of Cyathula prostata (Linn.) Blume weeds on adult rats.* Journal of Pharmaceutical Research International, 2016: p. 1-11.

369. Oladimeji, O.H. and C.O. Usifoh, *Anti-inflammatory Activity of Cyathula prostrata (L.) Blume.* African Journal of Pharmacology and Therapeutics, 2015. 4(1).

370. Mathialagan, R., et al., *Comparison of chemical composition and toxicity of essential oils from lemongrass (Cymbopogon citratus) extracted with microwave-assisted hydrodistillation (MAH) and conventional hydrodistillation (HD) methods.* J. Adv. Nat. Sci, 2014. 1(1): p. 10-15.

371. Leon-Anzueto, E., et al., *Effect of vermicompost, worm-bed leachate and arbuscular mycorrizal fungi on lemongrass (Cymbopogon citratus (DC) Stapf.) growth and composition of its essential oil.* Electronic Journal of Biotechnology, 2011. 14(6).

372. Barbosa, L.C.A., et al., *Evaluation of the chemical composition of Brazilian commercial Cymbopogon citratus (DC) stapf samples.* Molecules, 2008. 13(8): p. 1864-1874.

373. Fouad, R., et al., *Chemical Composition and Herbicidal Effects of Essential Oils of Cymbopogon citratus (DC) Stapf, Eucalyptus cladocalyx, Origanum vulgare L. and*

Artemisia absinthium L. cultivated in Morocco. Journal of Essential Oil Bearing Plants, 2015. 18(1): p. 112-123.

374. Ragasa, C.Y., et al., *Antimicrobial and cytotoxic terpenoids from Cymbopogon citratus Stapf.* Philipp Sci, 2008. 45: p. 111-22.

375. Cheel, J., et al., *Free radical scavengers and antioxidants from Lemongrass (Cymbopogon citratus (DC.) Stapf.).* Journal of agricultural and food chemistry, 2005. 53(7): p. 2511-2517.

376. Silva, N.B.d., et al., *Anti-Biofilm and Hemolytic Effects of Cymbopogon citratus (Dc) Stapf Essential Oil.* Pesquisa Brasileira em Odontopediatria e Clínica Integrada, 2020. 19.

377. Machraoui, M., et al., *Ethnobotanical and phytopharmacological notes on Cymbopogon citratus (DC.) Stapf.* Journal of new sciences, 2018. 55: p. 3642-3652.

378. Al-Snafi, A.E., *Medical importance of Datura fastuosa (syn: Datura metel) and Datura stramonium-A review.* IOSR Journal of Pharmacy, 2017. 7(2): p. 43-58.

379. Belayneh, Y.M., et al., *Evaluation of in vivo antidiabetic, antidyslipidemic, and in vitro antioxidant activities of hydromethanolic root extract of Datura stramonium L.(Solanaceae).* Journal of experimental Pharmacology, 2019. 11: p. 29.

380. Wang, Y., et al., *Anti-Psoriasis Inflammation And Anti-Oxidation of The Extract From The Flower of Datura Metel L.* 2021.

381. Monira, K.M. and S.M. Munan, *Review on Datura metel: A potential medicinal plant.* Global Journal of Research on Medicinal Plants & Indigenous Medicine, 2012. 1(4): p. 123.

382. Xue, J., et al., *Chemical composition and cytotoxicity of the essential oil from different parts of Datura metel L.* Natural product research, 2016. 30(17): p. 1938-1940.

383. Guo, R., et al., *A new sesquiterpenoid with cytotoxic and anti-inflammatory activity from the leaves of Datura metel L.* Natural product research, 2021. 35(4): p. 607-613.

384. Shifali Thakur, S.C., Isha Kumari, Madhusudan S, Bhawna Walia, Hemlata Kaurav and Gitika Chaudhary, *Datura (datura metel): a review based upon its ayurvedic prospective.*

385. Eleyowo, O.O., et al., *An investigation of phytochemicals, antioxidants and genotoxic potentials of Datura metel L.* 2018.

386. Iqbal, S., C. Sivaraj, and K. Gunasekaran, *Antioxidant and Anticancer Activities of Methanol Extract of Seeds of Datura stramonium l.* Free Radicals and Antioxidants, 2017. 7(2): p. 184-189.

387. Mackeen, M.M., et al., *Brine shrimp toxicity of fractionated extracts of Malaysian medicinal plants.* Natural Product Sciences, 2000. 6(3): p. 131-134.

388. Kuganathan, N. and S. Ganeshalingam, *Chemical analysis of Datura metel leaves and investigation of the acute toxicity on grasshoppers and red ants.* E-Journal of Chemistry, 2011. 8(1): p. 107-112.

389. Céspedes-Méndez, C., P. Iturriaga-Vásquez, and E. Hormazábal, *Secondary metabolites and biological profiles of Datura genus.* Journal of the Chilean Chemical Society, 2021. 66(2): p. 5183-5189.

390. Dr. Iyshwarya HS , D.M.R., *DATURA METEL: A DRUG REVIEW.* 2020.

391. PHUONG, P.T.H., et al., *EXTRACTION OF NATURAL DYE FROM DIOSPYROS MOLLIS (GRIFF.) FRUITS BY MANY DIFFERENT SOLVENTS AND APPLICATION OF DYED ON SILK FABRIC.* Journal of Science and Technology-IUH, 2020. 44(02).

392. Naoki, U., et al., *Diospyros Species in Thailand: Their Distribution, Fruit Morphology and Uses.* Economic Botany, 1998. 52(4): p. 343-351.

393. YOSHIHIRA, K., et al., *Naphthoquinone Derivatives from the Ebenaceae. I. Diospyrol and the Related Naphthoquinones from Diospyros mollis GRIFF.* Chemical and Pharmaceutical Bulletin, 1971. 19(11): p. 2271-2277.

394. Suwama, T., et al., *Naphthalene glycosides in the Thai medicinal plant Diospyros mollis.* Journal of Natural Medicines, 2018. 72(1): p. 220-229.

395. Paphassarang, S., M. Becchi, and J. Raynaud, *A new diospyrol glycoside from Diospyros mollis Griff.* Tetrahedron letters, 1984. 25(5): p. 523-526.

396. Unhanand, M., *Studies on Toxicity of Ma-klua (Diospyros mollis Griff.) Used as a Traditional Anthelmintic in Thailand I.* Bull. Dept. Med. Sci. Ministry Publ. Health (Bangkok), 1982. 24: p. 227.

397. Siriphong, S., P. Meepowpan, and P. Sangthong, *Anti-Breast Cancer Activity of Thai Herbal Medicine Formulation.*

398. *Diospyros mollis Griff.*

399. *Dipterocarpus alatus.*

400. Daodee, S., et al., *Effects of the ethanol extract of Dipterocarpus alatus leaf on the unpredictable chronic mild stress-induced depression in ICR mice and its possible mechanism of action.* Molecules, 2019. 24(18): p. 3396.

401. Khamphukdee, C., et al., *INFERTILE ACTIVITY OF DIPTEROCARPUS ALATUS ROXB. EX G. DON OIL.* ISPBS–5 PROCEEDINGS BOOK, 2019: p. 66.

402. Yongram, C., et al., *Chemical composition, antioxidant and cytotoxicity activities of leaves, bark, twigs and oleo-resin of Dipterocarpus alatus.* Molecules, 2019. 24(17): p. 3083.

403. Puthongking, P., et al., *Dipterocarpol in Oleoresin of Dipterocarpus alatus Attributed to Cytotoxicity and Apoptosis-Inducing Effect.* Molecules, 2022. 27(10): p. 3187.

404. *Dipterocarpus alatus Roxb. Ex G.Don.*

405. Mali, P.Y. and S.S. Panchal, *Euphorbia tirucalli L.: Review on morphology, medicinal uses, phytochemistry and pharmacological activities.* Asian Pacific Journal of Tropical Biomedicine, 2017. 7(7): p. 603-613.

406. de Souza, L.S., et al., *Analytical methods to access the chemical composition of an Euphorbia tirucalli anticancer latex from traditional Brazilian medicine.* Journal of ethnopharmacology, 2019. 237: p. 255-265.

407. do C Caxito, M.L., et al., *Antiproliferative activity of extracts of Euphorbia tirucalli L (Euphorbiaceae) from three regions of Brazil.* Tropical Journal of Pharmaceutical Research, 2017. 16(5): p. 1013-1020.

408. Gupta, N., et al., *Medicinal value of Euphorbia tirucalli.* Systematic Reviews in Pharmacy, 2013. 4(1): p. 40.

409. Aleixo, T., et al., *Phytochemical Screening and Investigation of Antimicrobial Activity from Derivatives of Aveloz (Euphorbia tirucalli L.).* 2018.

410. Altamimi, M., et al., *Antioxidant, anti-enzymatic, antimicrobial and cytotoxic properties of Euphorbia tirucalli L.* bioRxiv, 2019.

411. Aleksandrov, M., V. Maksimova, and L. Koleva Gudeva, *Review of the anticancer and cytotoxic activity of some species from genus Euphorbia.* Agriculturae Conspectus Scientificus, 2019. 84(1): p. 1-5.

412. Furqan, M., S. Lenny, and L. Marpaung, *Isolation of Phenolic Compound and Antibacterial Activity of Phenolic Extract of Patah Tulang (Euphorbia Tirucalli. L).*

413. Munro, B., et al., *Phytochemical, antioxidant and anti-cancer properties of Euphorbia tirucalli methanolic and aqueous extracts.* Antioxidants, 2015. 4(4): p. 647-661.

414. Kumar, A., et al., *Toxicity of aqueous extract of Euphorbia tirucalli latex on catfish, Heteropneustes fossilis.* Ecotoxicology and environmental safety, 2010. 73(7): p. 1671-1673.

415. Zone, G.-E., *16. Garcinia hanburyi Hook. f.* Maintenance of forest genetic resources is of crucial importance to sustainable development. However, global forest loss and degradation is resulting in a dramatic loss of biological diversity and options for utilisation and development. Cambodia is no exception, with several valuable indigenous tree species presently vulnerable to extinction at species, and in particular, at population level.: p. 43.

416. Tao, S.J., et al., *A highly rearranged pentaprenylxanthonoid from the resin of Garcinia hanburyi.* Helvetica Chimica Acta, 2010. 93(7): p. 1395-1400.

417. Doan, L.P., et al., *Fatty acid, tocopherol, sterol compositions and antioxidant activity of three Garcinia seed oils.* Records of Natural Products, 2018. 12(4): p. 323.

418. Panthong, A., et al., *Anti-inflammatory, analgesic and antipyretic activities of the extract of gamboge from Garcinia hanburyi Hook f.* Journal of ethnopharmacology, 2007. 111(2): p. 335-340.

419. Reutrakul, V., et al., *Anti-HIV-1 and Anti-Inflammatory Lupanes from the Leaves, Twigs, and Resin of Garcinia hanburyi.* Planta medica, 2010. 76(04): p. 368-371.

420. Jin, Y.M., et al., *α-Glucosidase inhibitory caged xanthones from the resin of Garcinia hanburyi.* Journal of Applied Biological Chemistry, 2019. 62(1): p. 81-86.

421. Hahnvajanawong, C., et al., *Apoptotic activity of caged xanthones from Garcinia hanburyi in cholangiocarcinoma cell lines.* World journal of gastroenterology: WJG, 2010. 16(18): p. 2235.

422. Lee, P.N.H. and W.S. Ho, *Antiproliferative activity of gambogic acid isolated from Garcinia hanburyi in Hep3B and Huh7 cancer cells.* Oncology reports, 2013. 29(5): p. 1744-1750.

423. *Garcinia hanburyi Hook.f.* 29 Jul 2012.

424. Phopin, K., S. Wanwimolruk, and V. Prachayasittikul, *Food safety in Thailand. 3: Pesticide residues detected in mangosteen (Garcinia mangostana L.), queen of fruits.* Journal of the Science of Food and Agriculture, 2017. 97(3): p. 832-840.

425. Liu, Q.Y., Y.T. Wang, and L.G. Lin, *New insights into the anti-obesity activity of xanthones from Garcinia mangostana.* Food Funct, 2015. 6(2): p. 383-93.

426. Al-Massarani, S.M., et al., *Phytochemical, antimicrobial and antiprotozoal evaluation of Garcinia mangostana pericarp and alpha-mangostin, its major xanthone derivative.* Molecules, 2013. 18(9): p. 10599-608.

427. Eukun Sage, E., et al., *From the Front or Back Door? Quantitative analysis of direct and indirect extractions of alpha-mangostin from mangosteen (Garcinia mangostana).* PLoS One, 2018. 13(10): p. e0205753.

428. Larsuprom, L., et al., *In vitro antibacterial activity of mangosteen (Garcinia mangostana Linn.) crude extract against Staphylococcus pseudintermedius isolates from canine pyoderma.* Vet Dermatol, 2019. 30(6): p. 487-e145.

429. Suksamrarn, S., et al., *Antimycobacterial activity of prenylated xanthones from the fruits of Garcinia mangostana.* Chem Pharm Bull (Tokyo), 2003. 51(7): p. 857-9.

430. Aisha, A.F., et al., *In vitro and in vivo anti-colon cancer effects of Garcinia mangostana xanthones extract.* BMC Complement Altern Med, 2012. 12: p. 104.

431. Dharmaratne, H.R., et al., *Antibacterial activity of xanthones from Garcinia mangostana (L.) and their structure-activity relationship studies.* Nat Prod Res, 2013. 27(10): p. 938-41.

432. Ee, G.C., et al., *Garcinia mangostana: a source of potential anti-cancer lead compounds against CEM-SS cell line.* J Asian Nat Prod Res, 2008. 10(5-6): p. 475-9.

433. Gopalakrishnan, G., B. Banumathi, and G. Suresh, *Evaluation of the antifungal activity of natural xanthones from Garcinia mangostana and their synthetic derivatives.* J Nat Prod, 1997. 60(5): p. 519-24.

434. Jung, H.A., et al., *Antioxidant xanthones from the pericarp of Garcinia mangostana (Mangosteen).* J Agric Food Chem, 2006. 54(6): p. 2077-82.

435. Mohammad, N.A., et al., *Optimization of the antioxidant-rich xanthone extract from mangosteen (Garcinia mangostana L.) pericarp via microwave-assisted extraction.* Heliyon, 2019. 5(10): p. e02571.

436. Sukatta, U., et al., *Distribution of major xanthones in the pericarp, aril, and yellow gum of mangosteen (Garcinia mangostana linn.) fruit and their contribution to antioxidative activity.* Biosci Biotechnol Biochem, 2013. 77(5): p. 984-7.

437. Wang, W., et al., *A novel xanthone dimer derivative with antibacterial activity isolated from the bark of Garcinia mangostana.* Nat Prod Res, 2018. 32(15): p. 1769-1774.

438. Zhao, Y., et al., *A new antioxidant xanthone from the pericarp of Garcinia mangostana Linn.* Nat Prod Res, 2010. 24(17): p. 1664-70.

439. Hafeez, B.B., et al., *alpha-Mangostin: a dietary antioxidant derived from the pericarp of Garcinia mangostana L. inhibits pancreatic tumor growth in xenograft mouse model.* Antioxid Redox Signal, 2014. 21(5): p. 682-99.

440. Lee, H.N., et al., *Antitumor and apoptosis-inducing effects of alpha-mangostin extracted from the pericarp of the mangosteen fruit (Garcinia mangostana L.)in YD-15 tongue mucoepidermoid carcinoma cells.* Int J Mol Med, 2016. 37(4): p. 939-48.

441. Mohan, S., et al., *An anti-inflammatory molecular mechanism of action of alpha-mangostin, the major xanthone from the pericarp of Garcinia mangostana: an in silico, in vitro and in vivo approach.* Food Funct, 2018. 9(7): p. 3860-3871.

442. Chang, H.F., C.H. Wu, and L.L. Yang, *Antitumour and free radical scavenging effects of gamma-mangostin isolated from Garcinia mangostana pericarps against hepatocellular carcinoma cell.* J Pharm Pharmacol, 2013. 65(9): p. 1419-28.

443. Fu, Y., et al., *Immune regulation and anti-inflammatory effects of isogarcinol extracted from Garcinia mangostana L. against collagen-induced arthritis.* J Agric Food Chem, 2014. 62(18): p. 4127-34.

444. Meepagala, K.M. and K.K. Schrader, *Antibacterial Activity of Constituents from Mangosteen Garcinia mangostana Fruit Pericarp against Several Channel Catfish Pathogens.* J Aquat Anim Health, 2018. 30(3): p. 179-184.

445. Wathoni, N., et al., *Characterization and antioxidant activity of pectin from Indonesian mangosteen (Garcinia mangostana L.) rind.* Heliyon, 2019. 5(8): p. e02299.

446. Pan-In, P., et al., *Cellular trafficking and anticancer activity of Garcinia mangostana extract-encapsulated polymeric nanoparticles.* Int J Nanomedicine, 2014. 9: p. 3677-86.

447. Garcia, M.L., et al., *Optimization of the antioxidant capacity of mangosteen peels (Garcinia mangostana L.) extracts: Management of the drying extraction processes.* Food Sci Technol Int, 2020: p. 1082013220962630.

448. Kondo, M., et al., *Bioavailability and antioxidant effects of a xanthone-rich Mangosteen (Garcinia mangostana) product in humans.* J Agric Food Chem, 2009. 57(19): p. 8788-92.

449. Tjahjani, S., Y. Biantoro, and R. Tjokropranoto, *Ethyl acetate Fraction of Garcinia Mangostana L Rind Study as Antimalaria and Antioxidant in Plasmodium berghei Inoculated Mice.* Open Access Maced J Med Sci, 2019. 7(12): p. 1935-1939.

450. Weecharangsan, W., et al., *Antioxidative and neuroprotective activities of extracts from the fruit hull of mangosteen (Garcinia mangostana Linn.).* Med Princ Pract, 2006. 15(4): p. 281-7.

451. Xie, Z., et al., *Functional beverage of Garcinia mangostana (mangosteen) enhances plasma antioxidant capacity in healthy adults.* Food Sci Nutr, 2015. 3(1): p. 32-8.

452. Ng, H.S., et al., *Surfactant as an Additive for the Recovery of Potent Antioxidants from Garcinia mangostana Pericarps Using a Polymer/Salt Aqueous Biphasic System.* Appl Biochem Biotechnol, 2020. 191(1): p. 273-283.

453. Ngawhirunpat, T., et al., *Antioxidant, free radical-scavenging activity and cytotoxicity of different solvent extracts and their phenolic constituents from the fruit hull of mangosteen (Garcinia mangostana).* Pharm Biol, 2010. 48(1): p. 55-62.

454. Lim, Y.K., et al., *Anti-inflammatory and in vitro bone formation effects of Garcinia mangostana L. and propolis extracts.* Food Sci Biotechnol, 2020. 29(4): p. 539-548.

455. Palakawong, C., et al., *Optimized extraction and characterization of antimicrobial phenolic compounds from mangosteen (Garcinia mangostana L.) cultivation and processing waste.* J Sci Food Agric, 2013. 93(15): p. 3792-800.

456. Chaijaroenkul, W., et al., *Proteomics analysis of antimalarial targets of Garcinia mangostana Linn.* Asian Pac J Trop Biomed, 2014. 4(7): p. 515-9.

457. Cunha, B.L., et al., *Evaluation of antimicrobial and antitumoral activity of Garcinia mangostana L. (mangosteen) grown in Southeast Brazil.* Acta Cir Bras, 2014. 29 Suppl 2: p. 21-8.

458. Narasimhan, S., et al., *Anti-Bacterial and Anti-Fungal Activity of Xanthones Obtained via Semi-Synthetic Modification of alpha-Mangostin from Garcinia mangostana.* Molecules, 2017. 22(2).

459. Tatiya-Aphiradee, N., W. Chatuphonprasert, and K. Jarukamjorn, *In vivo antibacterial activity of Garcinia mangostana pericarp extract against methicillin-resistant Staphylococcus aureus in a mouse superficial skin infection model.* Pharm Biol, 2016. 54(11): p. 2606-2615.

460. Janardhanan, S., et al., *Antimicrobial Effects of Garcinia Mangostana on Cariogenic Microorganisms.* J Clin Diagn Res, 2017. 11(1): p. ZC19-ZC22.

461. Oberholzer, I., et al., *Garcinia mangostana Linn displays antidepressant-like and pro-cognitive effects in a genetic animal model of depression: a bio-behavioral study in the Flinders Sensitive Line rat.* Metab Brain Dis, 2018. 33(2): p. 467-480.

462. Seesom, W., et al., *Antileptospiral activity of xanthones from Garcinia mangostana and synergy of gamma-mangostin with penicillin G.* BMC Complement Altern Med, 2013. 13: p. 182.

463. Tjahjani, S., *Antimalarial activity of Garcinia mangostana L rind and its synergistic effect with artemisinin in vitro.* BMC Complement Altern Med, 2017. 17(1): p. 131.

464. Wihastuti, T.A., et al., *Vasa vasorum anti-angiogenesis through H(2)O(2), HIF-1alpha, NF-kappaB, and iNOS inhibition by mangosteen pericarp ethanolic extract (Garcinia mangostana Linn) in hypercholesterol-diet-given Rattus norvegicus Wistar strain.* Vasc Health Risk Manag, 2014. 10: p. 523-31.

465. Manasathien, J., *EFFECTS OF MANGOSTEEN HULL EXTRACTS ON BIOEFFICACY AND ANTIPROLIFERATION OF HUMAN BREAST AND PROSTATE CARCINOMA CELL LINES.* Suranaree Journal of Science & Technology, 2017. 24(4).

466. Chayaburakul, K., et al., *Acute and subchronic oral toxicity of xanthones extracted from the pericarp of Garcinia mangostana Linn. in rat.* Asian Arch. Pathol., 2015. 11: p. 57-70.

467. Rahman, M.S., et al., *Rediscovery of Gonostegia Pentandra (Roxb.) Miq.(Urticaceae) from Bangladesh Sundarban.* Jahangirnagar University Journal of Biological Sciences, 2018. 7(2): p. 115-119.

468. Siriyong, T., et al., *Traditional Thai herbal medicine as an alternative treatment for refractory chronic eczema.* EXPLORE, 2020. 16(4): p. 242-249.

469. Li, T.S., *Taiwanese native medicinal plants: phytopharmacology and therapeutic values.* 2006.

470. Bhamarapravati, S., S. Pendland, and G. Mahady, *Extracts of spice and food plants from Thai traditional medicine inhibit the growth of the human carcinogen Helicobacter pylori.* In Vivo (Athens, Greece), 2003. 17(6): p. 541-544.

471. Klinthong, S., et al., *In vivo anti-inflammatory and in vitro antioxidant activities of a Thai traditional formula, Rid-si-duang-ma-ha-kan, for hemorrhoid treatment.* Mahidol Univ J Pharm Sci, 2015. 42(3): p. 144-152.

472. Goh, M.P.Y., et al., *Ethnobotanical review and pharmacological properties of selected medicinal plants in Brunei Darussalam: Litsea elliptica, Dillenia suffruticosa, Dillenia excelsa, Aidia racemosa, Vitex pinnata and Senna alata.* Asian Pacific Journal of Tropical Biomedicine, 2017. 7(2): p. 173-180.

473. Manosroi, A., et al., *Potent antiproliferative effect on liver cancer of medicinal plants selected from the Thai/Lanna medicinal plant recipe database "MANOSROI III".* Evidence-Based Complementary and Alternative Medicine, 2015. 2015.

474. Kummalue, T., et al., *Antiprolifrative Activities of Three Thai Medicinal Plants on Human Cancer Cells.* Siriraj Medical Journal, 2005. 57(11): p. 491-495.

475. Sarkar, C., et al., *Heliotropium indicum L.: From Farm to a Source of Bioactive Compounds with Therapeutic Activity.* Evidence-Based Complementary and Alternative Medicine, 2021. 2021.

476. Paul, S. and R. Kundu, *ROS mediated DNA damage and induction of apoptosis in cervical cancer cells by Heliotropium indicum L.* Journal of Applied Pharmaceutical Science, 2018. 8(08): p. 92-106.

477. Ghosh, P., et al., *Morphological characteristics and phyto-pharmacological detailing of Hatishur (Heliotropium indicum Linn.): A concise review.* Journal of Pharmacognosy and Phytochemistry, 2018. 7(5): p. 1900-1907.

478. Chunthorng-Orn, J., et al., *Cytotoxic, Anti-inflammatory and Antioxidant Activities of Heliotropium indicum Extracts.* Journal of the Medical Association of Thailand = Chotmaihet thangphaet, 2016. 99: p. S102-S109.

479. Satiraphan, M., *Phytochemical screening of two Thai tropical rainforest Dipterocarps: Hopea odorata Roxb. and Dipterocarpus costatus Gaertn. f*. 2012, Université René Descartes-Paris V; Silpakorn University. Faculty of Pharmacy ....

480. Kabir, M.S.H., et al., *Antioxidant, antidiarrheal, hypoglycemic and thrombolytic activities of organic and aqueous extracts of Hopea odorata leaves and in silico PASS prediction of its isolated compounds.* BMC complementary and alternative medicine, 2016. 16(1): p. 1-13.

481. Satiraphan, M., *Phytochemical study of hopea odorata roxb. and dipterocarpus costatus gaertn. f*. 2012, มหาวิทยาลัย ศิลปากร.

482. Kabir, M.S.H., et al., *Antibacterial activity of organic and aqueous extracts of Hopea odorata Roxb. leaves and their total flavonoid content.* British Microbiology Research Journal, 2015. 9(4): p. 1-7.

483. Nguyen, S.T., et al., *Hopea odorata extract inhibits hepatocellular carcinoma via induction of caspase-dependent apoptosis.* OncoTargets and therapy, 2017. 10: p. 5765.

484. Salleh, N.B., *Hopea odorata Roxb.(Dipterocarpaceae).* Malaysia Biodiversity Information System (MyBIS), 2018.

485. Kumar, D., et al., *Ethnobotanical and pharmacological review on Indigofera tinctoria.* International Research Journal of Pharmaceutical and Applied Sciences, 2020. 10(1): p. 1-6.

486. Hossain, A.M., et al., *Isolation and selection of Bradyrhizobium from the root nodules of indigo plants (Indigofera tinctoria L.).* African Journal of Biotechnology, 2012. 11(58): p. 12183-12191.

487. Renukadevi, K. and S.S. Sultana, *Determination of antibacterial, antioxidant and cytotoxicity effect of Indigofera tinctoria on lung cancer cell line NCI-h69.* Int J Pharmacol, 2011. 7(3): p. 356-362.

488. Singh, R., S. Sharma, and V. Sharma, *Comparative and quantitative analysis of antioxidant and scavenging potential of Indigofera tinctoria Linn. extracts.* Journal of Integrative Medicine, 2015. 13(4): p. 269-278.

489. Alluri, K., et al., *Assessment of Bioactivity of Indian Medicinal Plants Using Brine Shrimp (Artemia salina) Lethality Assay.* Int J Appl Sci Eng, 2004. 2.

490. Magesh, V., G.Y.M. Deecaraman, and P. Kalaichelvan, *Methanolic extract of Indigofera tinctoria induces apoptosis in HCT116 cells.* Journal of Applied Biosciences, 2009. 14: p. 768-774.

491. Manvar, M.N. and T. Desai, *Phytochemical and pharmacological profile of Ipomoea aquatica.* Indian journal of medical sciences, 2013. 67.

492. Bokolo, B. and E. Adikwu, *Ethanolic leaf extract of Ipomoea aquatica Forsk abrogates cisplatin-induced kidney damage in albino rats.* Journal of Nephropharmacology, 2018. 8(1): p. e02-e02.

493. Manvar, M.N., *Antibacterial activity of leaves and flowers of Ipomoea aquatica forsk.(Convolvulacea).* Asian Journal of Pharmaceutical Research, 2018. 8(2): p. 94-98.

494. Lawal, U., et al., *Antioxidant and [alpha]-Glucosidase Inhibitory Activities of Isolated Compounds from Ipomoea aquatica.* Records of Natural Products, 2016. 10(6): p. 701.

495. Bhalodi, M., S. Shukla, and A. Saluja, *PHCOG MAG.: Research Article In-vitro Antioxidant activity of the flowers of Ipomoea aquatica Forsk.*

496. Dhanasekaran, S., P. Perumal, and M. Palayan, *In-vitro Screening for acetylcholinesterase enzyme inhibition potential and antioxidant activity of extracts of Ipomoea aquatica Forsk: therapeutic lead for Alzheimer's disease.* J. Appl. Pharm. Sci, 2015. 5: p. 012-016.

497. Umar, K., et al., *Comparative study of antioxidant activities of the leaves and stem of Ipomoea aquatica Forsk (Water Spinach).* Nigerian Journal of Basic and Applied Sciences, 2015. 23(1): p. 81-84.

498. James, O., et al., *INVITRO AND INVIVO STUDIES ON THE ANTIOXIDATIVE ACTIVITIES, MEMBRANE STABILIZATION AND CYTOTOXICITY OF WATER SPINACH (Ipomoea aquatica Forsk) FROM IBAJI PONDS, NIGERIA.* Inter J. of PharmTech Res, 2009. 1(3): p. 474-482.

499. Khayungarnnawee, A., et al., *Cardiovascular Effects of the Ethanolic Extract of Ipomoea Aquatica Forsk. in Rat.* TJPS, 2018. 42(2018).

500. M, S., S. Ramachandran, and S. Mohan, *MTT Assay on Anticancer Properties of Phytoconstituents from Ipomoea aquatica forsskal using MCF-7 cell lines for breast cancer in Women.* Research Journal of Pharmacy and Technology, 2020. 13: p. 1356.

501. Jacoeb, A.M. and S. Purwaningsih, *Deskripsi Mikroskopis dan Kandungan Mineral Tanaman Kangkung Air (Ipomoea aquatica Forsk.).*

502. Umoh, O.T. and M.E. Bassey, *Morphology and distribution of species of the family Cucurbitaceae in Akwa Ibom State, Nigeria.* Phytotaxa, 2021. 508(2): p. 107–128-107–128.

503. Ghule, B.V., et al., *Antihyperlipidemic effect of the methanolic extract from Lagenaria siceraria Stand. fruit in hyperlipidemic rats.* J Ethnopharmacol, 2009. 124(2): p. 333-7.

504. Patel, S.B., U.A. Attar, and S. Ghane, *Antioxidant potential of wild Lagenaria siceraria (Molina) Standl.* Thai Journal of Pharmaceutical Sciences (TJPS), 2018. 42(2).

505. Kalsait, R.P., et al., *Isolation of phytosterols and antihyperlipidemic activity of Lagenaria siceraria.* Arch Pharm Res, 2011. 34(10): p. 1599-604.

506. Attar, U.A. and S.G. Ghane, *In vitro antioxidant, antidiabetic, antiacetylcholine esterase, anticancer activities and RP-HPLC analysis of phenolics from the wild bottle gourd (Lagenaria siceraria (Molina) Standl.).* South African Journal of Botany, 2019. 125: p. 360-370.

507. Mayakrishnan, V., et al., *Free radical scavenging potential of Lagenaria siceraria (Molina) Standl fruits extract.* Asian Pacific Journal of Tropical Medicine, 2013. 6(1): p. 20-26.

508. Ullah, M.O., et al., *Anti–bacterial activity and brine shrimp lethality bioassay of methanolic extracts of fourteen different edible vegetables from Bangladesh.* Asian Pacific journal of tropical biomedicine, 2013. 3(1): p. 1-7.

509. Shendge, P.N. and S. Belemkar, *Acute and 28-day oral toxicity studies of methanolic extract of Lagenaria siceraria (Cucurbitaceae) fruit in rats.* Drug and Chemical toxicology, 2021. 44(5): p. 493-501.

510. Kulju, K.K.M., S.E.C. Sierra, and P.C. Welzen, *Re-shaping Mallotus [Part 2]: inclusion of Neotrewia, Octospermum and Trewia in Mallotus s.s. (Euphorbiaceae s.s.).* Blumea - Biodiversity, Evolution and Biogeography of Plants, 2007. 52: p. 115-136.

511. Shilpi, J.A., A.I. Gray, and V. Seidel, *New cardenolides from the stem bark of Trewia nudiflora.* Fitoterapia, 2010. 81(6): p. 536-539.

512. Smith, M.A., et al., *Characterization of novel triacylglycerol estolides from the seed oil of Mallotus philippensis and Trewia nudiflora.* Lipids, 2013. 48(1): p. 75-85.

513. Chaity, A., et al., *Antibacterial Efficacy of the Methanol Extract of Fruits of Trewia nudiflora Linn. (Euphorbiaceae).* 2020. 3: p. 38-43.

514. Barua, K.N., et al., *Variation of fatty oil content in different populations of Mallotus nudiflorus (L.) Kulju & Welzen occurring in diverse agro climatic zones of Assam.* Journal of Medicinal Plants, 2022. 10(3): p. 30-35.

515. Begum, Y., *Antibacterial, Antioxidant and Cytotoxic activities of Trewia nudiflora.* PharmaTutor, 2016. 4(1): p. 37-41.

516. Rani, S. and K. Rahman, *Molsari (Mimusops elengi Linn.): A boon drug of traditional medicine.* International Journal of Pharmaceutical Sciences and Research, 2017. 8(1): p. 17.

517. Baliga, M.S., et al., *Chemistry and medicinal properties of the Bakul (Mimusops elengi Linn): A review.* Food Research International, 2011. 44(7): p. 1823-1829.

518. Kadam, P.V., et al., *Mimusops elengi: A review on ethnobotany, phytochemical and pharmacological profile.* Journal of Pharmacognosy and Phytochemistry, 2012. 1(3).

519. Nasrin, M., P. Dash, and M.R. Saha, *In vitro Anthelmintic and Cytotoxic Activities of Methanolic Bark Extract of Mimusops elengi Linn.* Stamford Journal of Pharmaceutical Sciences, 2010. 3: p. 20-24.

520. Zahid, H., et al., *Antiinflammatory and antioxidant activities of Mimusops elengiL.* L. Br J Pharm Res, 2016. 9(3): p. 1-10.

521. Karuppusamy, M., et al., *Mimusops Elengi Linn Plant Extract as an Efficient Green Corrosion Inhibitor for Mild Steel in Acidic Environment.* 2015. 4.

522. de Oliveira, M.S., et al., *Phytochemical profile and biological activities of Momordica charantia L.(Cucurbitaceae): A review.* African Journal of Biotechnology, 2018. 17(27): p. 829-846.

523. Parra, A.L., et al., *Antidiabetic, hypolipidemic, antioxidant and anti-inflammatory effects of Momordica charantia L. foliage extract.* Journal of Pharmacy & Pharmacognosy Research, 2021. 9(4): p. 537-548.

524. Rahmawati, R., H. Widiastuti, and E. Sulistya, *In Vitro Anti-Inflammatory Assay of Bitter Melon (Momordica charantia L.) Ethanol Extract.* Jurnal Fitofarmaka Indonesia, 2020. 7(3): p. 1-4.

525. Kharima, F.N. and R. Yuliani, *Aktivitas Sitotoksik Ekstrak Etanol Buah Pare (Momordica charantia L.) Terhadap Sel Kanker MCF-7 dan T47D*. 2019, Universitas Muhammadiyah Surakarta.

526. Purushoth Prabhu, T., et al., *In vitro anticancer activity of ethanolic extract of pericarp and seed parts of Momordica charantia on colon cancer cell lines.* Journal of Pharmacognosy and Phytochemistry, 2021. 10(3): p. 224-229.

527. Lestari, P. and P.G.M.W. Mahayasih, *Inhibition activity of angiotensin converting enzyme (ACE) and determination of total phenolic and flavonoid compound from bitter melon leaves (Momordica charantia L.).* Pharmacognosy Journal, 2017. 9(2).

528. Maneenin, C., et al., *Antioxidant capacity of Momordica charantia extract and its protective effect on testicular damage in valproic acid-induced rats.* Int J Morphol, 2018. 36(2): p. 447-453.

529. Tamilanban, T., *In vitro neuroprotective effect of charantin from Momordica charantia against neurotoxin and endoplasmic reticulum stress-induced cell death in SH-SY5Y cells.* International Journal of Green Pharmacy (IJGP), 2018. 12(03).

530. Yoshime, Luciana & Pereira de Melo, Illana & Gasparotto Sattler, José & Carvalho, Eliane & Filho, Jorge. (2016). Bitter gourd (Momordica charantia L.) seed oil as a naturally rich source of bioactive compounds for nutraceutical purposes. Nutrire. 41. 10.1186/s41110-016-0013-y.

531. Ogbonna, O., et al., *Phytochemical compositions of fruits of three Musa species at three stages of development.* IOSR Journal of Pharmacy and Biological Sciences, 2016. 11(3): p. 48-59.

532. Molina-Salinas, G.M., et al., *Bactericidal effect of the leaf extract from musa spp.(AAB group, silk subgroup), cv."manzano" against multidrug-resistant mycobacterium tuberculosis.* Journal of medicinal food, 2019. 22(11): p. 1183-1185.

533. Samsun Nahar, M., et al., *Asian Journal of Pharmacognosy.* Asian Journal of Pharmacognosy, 2017. 1(4): p. 31-34.

534. Kibria, A.A., et al., *Extraction and evaluation of phytochemicals from banana peels (Musa sapientum) and banana plants (Musa paradisiaca).* substance, 2019. 10: p. 13.

535. Vilhena, R.d.O., et al., *Morpho-anatomy of the inflorescence of Musa× paradisiaca.* Revista Brasileira de Farmacognosia, 2019. 29: p. 147-151.

536. Al-Mqbali, L.R.A. and M.A. Hossain, *Cytotoxic and antimicrobial potential of different varieties of ripe banana used traditionally to treat ulcers.* Toxicology reports, 2019. 6: p. 1086-1090.

537. Thomas, A. and K. Krishnakumar, *Banana peel: pharmacological activities: a Review.* International Journal of Innovative research and advanced studies, 2017. 4(5): p. 62-4.

538. Dahham, S.S., et al., *Antioxidant activities and anticancer screening of extracts from banana fruit (Musa sapientum).* Academic Journal of Cancer Research, 2015. 8(2): p. 28-34.

539. Goodies, M.E., et al., *Anti-ulcerogenic Activity of Aqueous Extract of Unripe Fruit of Musa sapientum Linn in Combination with Vitamin C on Ulcer Induced Models in Experimental Rats.* European Journal of Medicinal Plants, 2017: p. 1-6.

540. Imam, M.Z. and S. Akter, *Musa paradisiaca L. and Musa sapientum L. : A Phytochemical and Pharmacological Review.* Journal of Applied Pharmaceutical Science, 2011. 01.

541. Imam, M.Z. and S. Akter, *Musa paradisiaca l. and musa sapientum l. : A phytochemical and pharmacological review.* journal of applied pharmaceutical science, 2011. 1: p. 14-20.

542. Asuquo, E.G. and C.E. Udobi, *Antibacterial and toxicity studies of the ethanol extract of Musa paradisiaca leaf.* Cogent Biology, 2016. 2(1): p. 1219248.

543. Kappel, V.D., et al., *Beneficial effects of banana leaves (Musa x paradisiaca) on glucose homeostasis: multiple sites of action.* Revista Brasileira de Farmacognosia, 2013. 23(4): p. 706-715.

544. Acharya, J., S. Karak, and B. De, *Metabolite profile and bioactivity of Musa X paradisiaca L. flower extracts.* Journal of Food Biochemistry, 2016. 40(6): p. 724-730.

545. Rao, N.M., S. Prasad, and N. Jyothirmayi, *Efficacy of ripened and unripened fruit extracts of Musa X paradisiaca L.(Bontha cultivar) against human pathogens.* International Journal of Pharmacy and Pharmaceutical Sciences, 2012. 4(1): p. 455-460.

546. Shawa, I., et al., *Brine shrimp lethality and phytochemical determination of aqueous extracts of Senna singueana , Musa paradisiaca , and Ziziphus mucronata in Malawi.* Journal of Basic and Applied Research, 2015. 1: p. 82-88.

547. Ariffin, M.M., et al., *In vitro antibacterial, antioxidant, and cytotoxicity evaluations of Musa paradisiaca cv. Sekaki florets from Sarawak, Malaysia.* Journal of Applied Pharmaceutical Science, 2021. 11.

548. Ugbogu, E.A., et al., *Toxicological profile of the aqueous-fermented extract of Musa paradisiaca in rats.* Avicenna Journal of Phytomedicine, 2018. 8(6): p. 478.

549. Latha, P., et al., *Pharmacology and chemistry of Myristica fragrans Houtt.-a review.* Journal of Spices and Aromatic Crops, 2005. 14(2): p. 94-101.

550. Ha, M.T., et al., *Phytochemical and pharmacological properties of Myristica fragrans Houtt.: an updated review.* Archives of Pharmacal Research, 2020. 43(11): p. 1067-1092.

551. Olaleye, M., C. Akinmoladun, and A. Akindahunsi, *Antioxidant properties of Myristica fragrans (Houtt) and its effect on selected organs of albino rats.* African Journal of Biotechnology, 2006. 5(15).

552. Gupta, A.D., et al., *Chemistry, antioxidant and antimicrobial potential of nutmeg (Myristica fragrans Houtt).* Journal of Genetic engineering and Biotechnology, 2013. 11(1): p. 25-31.

553. Pillai, S., R. Mahmud, and S. Ismail, *Studies on the Phytochemical Properties and Brine Shrimp Toxicity of Essential Oil Extracted from Myristica fragrans Houtt. (Nutmeg).* Journal of essential oil-bearing plants JEOP, 2012. 15: p. 53-57.

554. Chirathaworn, C., et al., *Myristica fragrans Houtt. methanolic extract induces apoptosis in a human leukemia cell line through SIRT1 mRNA downregulation.* Journal of the Medical Association of Thailand = Chotmaihet thangphaet, 2007. 90: p. 2422-8.

555. Hayfaa, A.A.-S., A.M.A.-S. Sahar, and M.A.-S. Awatif, *Evaluation of analgesic activity and toxicity of alkaloids in Myristica fragrans seeds in mice.* Journal of pain research, 2013. 6: p. 611.

556. *Polyphenols and its source C. terminalis (L.) kunth and Myristica fragrans Houtt*. 2015.

557. Al-Lahham, S., et al., *Antioxidant, antimicrobial and cytotoxic properties of four different extracts derived from the roots of Nicotiana tabacum L.* European Journal of Integrative Medicine, 2020. 33: p. 101039.

558. He, X.-F., et al., *Two new cembranic diterpenoids from the flowers of Nicotiana tabacum L.* Phytochemistry Letters, 2016. 15: p. 238-244.

559. Frega, N., et al., *Chemical composition of tobacco seeds (Nicotiana tabacum L.).* Journal of the American Oil Chemists Society, 1991. 68(1): p. 29-33.

560. Anumudu, C., et al., *Antimicrobial activities of extracts of tobacco leaf (Nicotiana tabacum) and its grounded snuff (utaba) on Candida albicans and Streptococcus pyogenes.* J Trop Dis, 2019. 7(300): p. 2.

561. Subba, B. and S. Thapa, *Analysis of phytoconstituents and biological activities on the selected medicinal plants of Dolakha and Sindhualchowk district of Nepal.* Journal of Institute of Science and Technology, 2018. 22(2): p. 140-147.

562. Kusumawardani, B., et al., *Cytotoxic Potential of Flavonoid from Nicotiana tabacum Leaves on MCF-7 Human Breast Cancer Cells.* Indonesian Journal of Cancer Chemoprevention, 2020. 11(2): p. 97-102.

563. Andjani, H., et al. *Acute oral toxicity test of nicotiana tabacum L. Bio-oil against female winstar rats*. in *IOP Conference Series: Earth and Environmental Science*. 2019. IOP Publishing.

564. Qin, M., et al., *Genome-Wide Analysis of the G2-Like Transcription Factor Genes and Their Expression in Different Senescence Stages of Tobacco (Nicotiana tabacum L.).* Frontiers in Genetics, 2021. 12(787).

565. Schachtsiek, J. and F. Stehle, *Nicotine-free, nontransgenic tobacco (Nicotiana tabacum L.) edited by CRISPR-Cas9.* Plant Biotechnology Journal, 2019.

566. Makmur, K., T. CHIKMAWATI, and S. SOBIR, *Genetic variability of lemon basil (Ocimum× africanum Lour.) from Indonesian archipelago based on morphological and inter-simple sequence repeats markers.* Biodiversitas Journal of Biological Diversity, 2020. 21(12).

567. Pisutthanan, N. and S. Pisutthanan, *Variability of essential oil constituents of Ocimum africanum.* Naresuan University Journal: Science and Technology (NUJST), 2013. 17(3): p. 269-274.

568. Limanan, D., E. Yulianti, and F. Ferdinal. *Phytochemical Screening, Total Antioxidant Capacity, and Toxicity Test of Basil Leaf Extract (Ocimum x africanum Lour)*. in *1st Tarumanagara International Conference on Medicine and Health (TICMIH 2021)*. 2021. Atlantis Press.

569. Ashish, K., et al., *Intercropping and mixed herb distillation for high-quality oil yield using lemon-scented basil (Ocimum africanum Lour.) cv. CIM-Jyoti and lemongrass (Cymbopogon flexuous (Nees ex Steud.) cv. Krishna.* Acta Ecologica Sinica, 2021.

570. Lal, R., et al., *Registration of high citral rich essential oil yielding variety-CIM Jyoti of Ocimum africanum.* Journal of Medicinal and Aromatic Plant Sciences 2017a, 2017. 39(2-4): p. 135-138.

571. Nadeem, H.R., et al., *Toxicity, Antioxidant Activity, and Phytochemicals of Basil (Ocimum basilicum L.) Leaves Cultivated in Southern Punjab, Pakistan.* Foods, 2022. 11(9): p. 1239.

572. Kathirvel, P. and R. Subban, *Chemical composition of the essential oil from basil (Ocimum basilicum Linn.) and its in vitro cytotoxicity against HeLa and HEp-2 human cancer cell lines and NIH 3T3 mouse embryonic fibroblasts.* Natural product research, 2011. 26: p. 1112-8.

573. Rasekh, H.R., et al., *Safety assessment of Ocimum basilicum hydroalcoholic extract in wistar rats: acute and subchronic toxicity studies.* Iranian journal of basic medical sciences, 2012. 15(1): p. 645.

574. Ilyas, U., D.P. Katare, and V. Aeri, *ETHANOMEDICINAL, PHYTOCHEMICAL AND PHARMACOLOGICAL INVESTIGATION OF OCIMUM TENUIFLORUM LINN.*

575. Rahmawati, F. and H. Silaban, *Bioactivity of Kemangi Leaves (Ocimum sanctum) and Ruku Leaves (Ocimum tenuiflorum).* International Journal of Health Sciences and Research, 2021. 11(5): p. 379-391.

576. Bhattacharya, S., *Medicinal plants and natural products in amelioration of arsenic toxicity: a short review.* Pharmaceutical Biology, 2017. 55(1): p. 349-354.

577. Gupta, R.K., D. Kumari, and A.K. Saxena, *Antiproliferative and Antioxidant effect of Ocimum tenuiflorum leaves extract on Breast cancer cell lines: In vitro study.* Annals of the Romanian Society for Cell Biology, 2021. 25(6): p. 6433-6442.

578. Hinaz, N. and R. Geetha, *Anticarcinogenic effect of Ocimum tenuiflorum on oral cancer cell lines.* Drug Invention Today, 2018. 10.

579. Lam, S., G. Neda, and M. Rabeta, *The anticancer effect of Ocimum tenuiflorum leaves.* Food Research, 2018. 2(2): p. 154-162.

580. Khan, I., et al., *Evaluation of antileishmanial, antibacterial and brine shrimp cytotoxic potential of crude methanolic extract of Herb Ocimum basilicum (Lamiacea).* Journal of Traditional Chinese Medicine, 2015. 35(3): p. 316-322.

581. Salleh, R.M., *Toxicology assessment of Ocimum tenuiflorum L. leaves extracts on streptozotocin-induced diabetic rats.* Malaysian Journal of Microscopy, 2018. 14(1).

582. Revathi, J., et al., *In vitro propagation, in vitro flowering, ex vitro root regeneration and foliar micro-morphological analysis of Hedyotis biflora (Linn.) Lam.* Vegetos, 2019. 32(4): p. 609-619.

583. Ding, X., D. Bai, and J. Qian, *Novel cyclotides from Hedyotis biflora inhibit proliferation and migration of pancreatic cancer cell in vitro and in vivo.* Medicinal Chemistry Research, 2014. 23(3): p. 1406-1413.

584. Wong, C.T., et al., *Optimal oxidative folding of the novel antimicrobial cyclotide from Hedyotis biflora requires high alcohol concentrations.* Biochemistry, 2011. 50(33): p. 7275-7283.

585. Purba, R. and P. Paengkoum, *Bioanalytical HPLC method of Piper Betle L. for quantifying phenolic compound, water-soluble vitamin, and essential oil in five different solvent extracts.* Journal of Applied Pharmaceutical Science, 2019. 9: p. 033-039.

586. Kudva, A.K., et al., *Piper betle Linn. in Cancer: Past, Present, and Future*, in *Anticancer plants: Properties and Application: Volume 1*, M.S. Akhtar and M.K. Swamy, Editors. 2018, Springer Singapore: Singapore. p. 327-347.

587. Ghosh, K. and T.K. Bhattacharya, *Chemical constituents of Piper betle Linn. (Piperaceae) roots.* Molecules (Basel, Switzerland), 2005. 10(7): p. 798-802.

588. Nerdy, N., et al., *Brine Shrimp (Artemia salina Leach.) Lethality Test of Ethanolic Extract from Green Betel (Piper betle Linn.) and Red Betel (Piper crocatum Ruiz and Pav.) through the Soxhletation Method for Cytotoxicity Test.* Open Access Macedonian Journal of Medical Sciences, 2021. 9(A): p. 407-412.

589. Rungrojsakul, M., *Cytotoxic and antiproliferative effects of crude ethanolic extract from Piper betle leaves on leukemic cell lines.* Journal of Associated Medical Sciences, 2021.

590. Dosoky, N.S., et al., *Volatiles of black pepper fruits (Piper nigrum L.).* Molecules, 2019. 24(23): p. 4244.

591. Sriwiriyajan, S., et al., *Anticancer and Cancer Prevention Effects of Piperine-Free Piper nigrum Extract on N-nitrosomethylurea-Induced Mammary Tumorigenesis in Rats.* Cancer Prev Res (Phila), 2016. 9(1): p. 74-82.

592. Gulcin, I., *The antioxidant and radical scavenging activities of black pepper (Piper nigrum) seeds.* Int J Food Sci Nutr, 2005. 56(7): p. 491-9.

593. Tan, L.Y., W.F. Yin, and K.G. Chan, *Piper nigrum, Piper betle and Gnetum gnemon--natural food sources with anti-quorum sensing properties.* Sensors (Basel), 2013. 13(3): p. 3975-85.

594. Ee, G.C., et al., *Pellitorine, a potential anti-cancer lead compound against HL6 and MCT-7 cell lines and microbial transformation of piperine from Piper Nigrum.* Molecules, 2010. 15(4): p. 2398-404.

595. Hritcu, L., et al., *Anxiolytic and antidepressant profile of the methanolic extract of Piper nigrum fruits in beta-amyloid (1-42) rat model of Alzheimer's disease.* Behav Brain Funct, 2015. 11: p. 13.

596. Kapoor, I.P., et al., *Chemistry and in vitro antioxidant activity of volatile oil and oleoresins of black pepper (Piper nigrum).* J Agric Food Chem, 2009. 57(12): p. 5358-64.

597. Majdalawieh, A.F. and R.I. Carr, *In vitro investigation of the potential immunomodulatory and anti-cancer activities of black pepper (Piper nigrum) and cardamom (Elettaria cardamomum).* J Med Food, 2010. 13(2): p. 371-81.

598. Turrini, E., P. Sestili, and C. Fimognari, *Overview of the Anticancer Potential of the "King of Spices" Piper nigrum and Its Main Constituent Piperine.* Toxins (Basel), 2020. 12(12).

599. Tu, Y., et al., *Anticholinesterases and antioxidant alkamides from Piper nigrum fruits.* Nat Prod Res, 2016. 30(17): p. 1945-9.

600. Vijayakumar, R.S. and N. Nalini, *Efficacy of piperine, an alkaloidal constituent from Piper nigrum on erythrocyte antioxidant status in high fat diet and antithyroid drug induced hyperlipidemic rats.* Cell Biochem Funct, 2006. 24(6): p. 491-8.

601. Alqarni, M.H., et al., *Combining Normal/Reversed-Phase HPTLC with Univariate Calibration for the Piperine Quantification with Traditional and Ultrasound-Assisted Extracts of Various Food Spices of Piper nigrum L. under Green Analytical Chemistry Viewpoint.* Molecules, 2021. 26(3).

602. Ngo, Q.M., et al., *Alkaloids from Piper nigrum Exhibit Antiinflammatory Activity via Activating the Nrf2/HO-1 Pathway.* Phytother Res, 2017. 31(4): p. 663-670.

603. Pei, H., et al., *Alkaloids from Black Pepper (Piper nigrum L.) Exhibit Anti-Inflammatory Activity in Murine Macrophages by Inhibiting Activation of NF-kappaB Pathway.* J Agric Food Chem, 2020. 68(8): p. 2406-2417.

604. Umadevi, P., et al., *Proteomics assisted profiling of antimicrobial peptide signatures from black pepper (Piper nigrum L.).* Physiol Mol Biol Plants, 2018. 24(3): p. 379-387.

605. Abukawsar, M.M., et al., *Chemical, pharmacological and nutritional quality assessment of black pepper (Piper nigrum L.) seed cultivars.* Journal of Food Biochemistry, 2018. 42(6): p. e12590.

606. Banerjee, D., et al., *Muscodor albus MOW12 an Endophyte of Piper nigrum L. (Piperaceae) Collected from North East India Produces Volatile Antimicrobials.* Indian J Microbiol, 2014. 54(1): p. 27-32.

607. Das, N., *Propagation prospects of dye yielding plant, Rhinacanthus nasutus (Linn.) Kurz.* 2006.

608. Bulugahapitiya, V.P., P. Fernando, and H. Jayasekara, *Anti-oxidant, pediculicidal and pesticidal activities of leaves of Rhinacanthus nasutus (Linn) grown in Sri Lanka.* Asian Journal of Medical and Biological Research, 2020. 6(4): p. 754-760.

609. Jayapriya, G., *Phytochemical analysis and antimicrobial efficacy of Rhinacanthus nasutus (l) Linn.* Journal of Pharmacognosy and Phytochemistry, 2015. 3(6).

610. Ngoc, T.M., et al., *A new naphthoquinone analogue and antiviral constituents from the root of Rhinacanthus nasutus.* Natural product research, 2019. 33(3): p. 360-366.

611. Kaffoor, A., A. Venkatachalapathi, and K. Arumugasamy, *IN VITRO ANTIOXIDANT ACTIVITY OF AQUEOUS AND ETHANOL LEAF EXTRACTS OF RHINACANTHUS NASUTUS (LINN.) KURZ.(ACANTHACEAE).* Kongunadu Research Journal, 2018. 5(2): p. 53-55.

612. Shah, M.A., J.E. Keach, and P. Panichayupakaranant, *Antidiabetic naphthoquinones and their plant resources in Thailand.* Chemical and Pharmaceutical Bulletin, 2018. 66(5): p. 483-492.

613. Thongchuai, B., et al., *Anti-herpes simplex virus type 2 activity from Rhinacanthus nasutus (Linn.) Kurz. extracts as affected by different extraction solvents.* Nat. Sci, 2019. 18: p. 14-26.

614. Boonyaketgoson, S., et al., *Naphthoquinones from the leaves of Rhinacanthus nasutus having acetylcholinesterase inhibitory and cytotoxic activities.* Fitoterapia, 2018. 124: p. 206-210.

615. Mohammed, M. and Z. Hamza, *Physicochemical properties of oil extracts from Sesamum Indicum L. seeds grown in Jigawa State–Nigeria.* Journal of Applied Sciences and Environmental Management, 2008. 12(2).

616. Xu, H. and Y. Wen, *In vitro antitumour activity of Sesamum indicum Linn flower extracts.* Tropical Journal of Pharmaceutical Research, 2010. 9(5).

617. Hilmi, Y. *A Study of antioxidant activity, enzymatic inhibition and in vitro cytotoxicity of selected traditional Sudanese plants with anti-diabetic potential*. in *Qatar Foundation Annual Research Forum Volume 2013 Issue 1*. 2013. Hamad bin Khalifa University Press (HBKU Press).

618. Hassan, M.A., *Studies on Egyptian sesame seeds (Sesamum indicum L.) and its products 1-physicochemical analysis and phenolic acids of roasted Egyptian sesame*

seeds (Sesamum indicum L.). World Journal of Dairy & Food Sciences, 2012. 7(2): p. 195-201.

619. Kumar, P.S., J. Patel, and M. Saraf, *Mechanism of vasorelaxant activity of a fraction of root extract of Sesamum indicum Linn.* 2008.

620. FLAX, A.O.I., *SYNERGISTIC ANTI-INFLAMMATORY AND ANTIOXIDANT ACTIVITIES OF INDIAN FLAX AND SESAME SEED LIGNANS.*

621. Kiran, K. and M. Asad, *Wound healing activity of Sesamum indicum L seed and oil in rats.* 2008.

622. Srisayam, M., et al., *Antioxidant, antimelanogenic, and skin-protective effect of sesamol.* J cosmet Sci, 2014. 65(2): p. 69-79.

623. Nivethitha, R., et al., *In Vitro Anticancer Effect of Sesamum Indicum Extract.* Journal of Complementary Medicine Research, 2020. 11(5): p. 99-105.

624. Yusuf, M., et al., *Determination of median lethal dose of ethanolic extract of Sesamum Indicum seeds in adult wistar rats.* African Journal of Cellular Pathology, 2017. 9(2): p. 73-76.

625. Hsu, D.-Z., P.-Y. Chu, and M.-Y. Liu, *Extracts of sesame (Sesamum indicum L.) seeds and gastric mucosal cytoprotection*, in *Nuts and Seeds in Health and Disease Prevention*. 2011, Elsevier. p. 1019-1027.

626. Sam, H.V., K. Nanthavong, and P.J.A. Kessler, *Trees of Laos and Vietnam: A Field Guide to 100 Economically or Ecologically Important Species.* Blumea - Biodiversity, Evolution and Biogeography of Plants, 2004. 49: p. 201-349.

627. Salbitano, F., L. Bernasconi, and G. Calamini, *Seed and seedling ecology of Shorea siamensis and Shorea obtusa in the dry dipterocarp forest of Huai Kha Khaeng (Thailand)*. 2001, Curtin University of Technology: Bentley. p. 52-61.

628. Tancharoen, C., *Experimental and Theoretical Studies on Resveratrol Oligomer Compounds from the Bark of Dipterocarpacease Family Against HIV-1 Reverse Transcriptase*. 2012, Kasetsart University.

629. *Shorea siamensis Miq. .*

630. Naujeer, H.B., *Morphological diversity in eggplant (Solanum melongena L.), their related species and wild types conserved at the National gene bank in Mauritius.* 2009.

631. Yang, B.-Y., et al., *Terpenes and lignans from the roots of Solanum melongena L.* Natural product research, 2020. 34(3): p. 359-368.

632. Croitoru, C., et al., *Eggplant Peels as a Valuable Source of Anthocyanins: Extraction, Thermal Stability and Biological Activities.* Plants, 2021. 10(3): p. 577.

633. Diatta, K., et al., *Study of Antioxidant Activity of Stalk and Fruit of Solanum melongena L.(Solanaceae).* Asian Journal of Research in Medical and Pharmaceutical Sciences, 2019: p. 1-7.

634. Liu, Y., et al., *A New Phenylpropanoid from the Roots of Solanum melongena L. and Evaluation of Anti-inflammatory Activity.* Records of Natural Products, 2021. 15(4): p. 261-266.

635. Salama, M. and S.M. Ezzat, *In vitro and in vivo anticancer activity of the fruit peels of Solanum melongena L. against hepatocellular carcinoma.* 2013.

636. Chouaibi, M., et al., *Influence of drying processes on bioactive compounds profiles, hydroxymethylfurfural, color parameters, and antioxidant activities of Tunisian eggplant (Solanum melongena L.).* Journal of Food Processing and Preservation, 2021: p. e15460.

637. Sultana, R. and M. Misbahuddin, *Effects of solasodine of Solanum melongena peel origin in the treatment of palmar arsenical keratosis.* Bangabandhu Sheikh Mujib Medical University Journal, 2020. 13(2): p. 47-52.

638. Wahab, A.A., et al., *Effects of aqueous extract of Solanum melongena on blood system of wistar rats.* World Journal of Life Sciences and Medical Research, 2012. 2(5): p. 159.

639. Sujarwo, W. and A.P. Keim, *Spondias pinnata (Lf) Kurz. Anacardiaceae*, in *Ethnobotany of the Mountain Regions of Southeast Asia*. 2021, Springer. p. 1009-1014.

640. Sai, K., et al., *Evaluation of the Hypoglycemic Potential of Leaves Extract of Spondias pinnata (Lf) Kurz. from Nepal.* The Scientific World Journal, 2021. 2021.

641. Hafiz, M., *Preliminary Phytochemical Screening, Antioxidant Activity & Cytotoxic Activity Evaluation of Spondias pinnata Barks*. 2014, East West University.

642. Ahlam, A.A., et al., *Spondias pinnata (lf) Kurz leaf extract derived zinc oxide nanoparticles induce dual modes of apoptotic-necrotic death in HCT 116 and K562 cells.* Biological Trace Element Research, 2021. 199(5): p. 1778-1801.

643. Attanayake, A.P., *Toxicological investigation of Spondias pinnata (Linn. F.) Kurz.(Family: Anacardiaceae) bark extract in Wistar rats.* International Journal of Green Pharmacy (IJGP), 2015. 9(1): p. 26-31.

644. Sujarwo, W. and A.P. Keim, *Chapter 27 - Spondias pinnata (L. f.) Kurz. (Anacardiaceae): Profiles and Applications to Diabetes*, in *Bioactive Food as Dietary Interventions for Diabetes (Second Edition)*, R.R. Watson and V.R. Preedy, Editors. 2019, Academic Press. p. 395-405.

645. Kaur, K. and S. Kaushal, *Phytochemistry and pharmacological aspects of Syzygium aromaticum: A review.* J. Pharmacogn. Phytochem, 2019. 8: p. 398-406.

646. Selles, S.M.A., et al., *Chemical composition, in-vitro antibacterial and antioxidant activities of Syzygium aromaticum essential oil.* Journal of Food Measurement and Characterization, 2020. 14: p. 2352-2358.

647. Prashar, A., I.C. Locke, and C.S. Evans, *Cytotoxicity of clove (Syzygium aromaticum) oil and its major components to human skin cells.* Cell Prolif, 2006. 39(4): p. 241-8.

648. Koba, K., et al., *Antibacterial activities of the buds essential oil of Syzygium aromaticum (L.) Merr. & Perry from Togo.* Journal of Biologically Active Products from Nature, 2011. 1(1): p. 42-51.

649. Maggi, M.D., et al., *Laboratory evaluations of Syzygium aromaticum (L.) Merr. et Perry essential oil against Varroa destructor.* Journal of Essential Oil Research, 2010. 22(2): p. 119-122.

650. Boughendjioua, H., *Essential Oil Composition of Syzygium aromaticum (L.).* International Research Journal of Pharmacy and Medical Sciences (IRJPMS), 2018. 1(3): p. 26-28.

651. Yassin, M.T., et al., *Bioactivity of Syzygium aromaticum (L.) Merr. & LM Perry extracts as potential antimicrobial and anticancer agents.* Journal of King Saud University-Science, 2020. 32(8): p. 3273-3278.

652. Afanyibo, Y., et al., *Toxicity and antioxidant activity of Syzygium aromaticum, Mondia whitei, Carissa spinarum and Caesalpinia bonduc.* The Journal of Phytopharmacology, 2019. 8(3): p. 124-128.

653. Krishnaraju, A.V., et al., *Biological screening of medicinal plants collected from Eastern Ghats of India using Artemia salina (brine shrimp test).* International Journal of Applied Science and Engineering, 2006. 4(2): p. 115-125.

654. Vijayasteltar, L., et al., *Safety assessment of a standardized polyphenolic extract of clove buds: Subchronic toxicity and mutagenicity studies.* Toxicology Reports, 2016. 3: p. 439-449.

655. Baser, K.H.C., *Karanfil (Syzigium aromaticum (L.) Merr. et Perry.* BagBahce, 2014: p. 26-27.

656. Komakech, R., et al., *Anti-inflammatory and analgesic potential of Tamarindus indica Linn. (Fabaceae): a narrative review.* Integr Med Res, 2019. 8(3): p. 181-186.

657. Ushanandini, S., et al., *The anti-snake venom properties of Tamarindus indica (leguminosae) seed extract.* Phytother Res, 2006. 20(10): p. 851-8.

658. Krishna, R.N., R. Anitha, and D. Ezhilarasan, *Aqueous extract of Tamarindus indica fruit pulp exhibits antihyperglycaemic activity.* Avicenna J Phytomed, 2020. 10(5): p. 440-447.

659. Nwodo, U.U., et al., *Effects of fractionation and combinatorial evaluation of Tamarindus indica fractions for antibacterial activity.* Molecules, 2011. 16(6): p. 4818-27.

660. Guneidy, R.A., et al., *Antioxidant or pro-oxidant and glutathione transferase P1-1 inhibiting activities for Tamarindus indica seeds and their cytotoxic effect on MCF-7 cancer cell line.* J Genet Eng Biotechnol, 2020. 18(1): p. 74.

661. Amir, M., et al., *Ameliorating effects of Tamarindus indica fruit extract on anti-tubercular drugs induced liver toxicity in rats.* Nat Prod Res, 2016. 30(6): p. 715-9.

662. Aravind, S.R., et al., *Antitumor and immunopotentiating activity of polysaccharide PST001 isolated from the seed kernel of Tamarindus indica: an in vivo study in mice.* ScientificWorldJournal, 2012. 2012: p. 361382.

663. Azman, K.F., et al., *Antiobesity effect of Tamarindus indica L. pulp aqueous extract in high-fat diet-induced obese rats.* J Nat Med, 2012. 66(2): p. 333-42.

664. Bhadoriya, S.S., et al., *Anti-Inflammatory and Antinociceptive Activities of a Hydroethanolic Extract of Tamarindus indica Leaves.* Sci Pharm, 2012. 80(3): p. 685-700.

665. Escalona-Arranz, J.C., et al., *Antioxidant and toxicological evaluation of a Tamarindus indica L. leaf fluid extract.* Nat Prod Res, 2016. 30(4): p. 456-9.

666. Razali, N., et al., *Investigation into the effects of antioxidant-rich extract of Tamarindus indica leaf on antioxidant enzyme activities, oxidative stress and gene expression profiles in HepG2 cells.* PeerJ, 2015. 3: p. e1292.

667. Natukunda, S., J.H. Muyonga, and I.M. Mukisa, *Effect of tamarind (Tamarindus indica L.) seed on antioxidant activity, phytocompounds, physicochemical characteristics, and sensory acceptability of enriched cookies and mango juice.* Food Sci Nutr, 2016. 4(4): p. 494-507.

668. Lim, C.Y., et al., *In vivo biochemical and gene expression analyses of the antioxidant activities and hypocholesterolaemic properties of Tamarindus indica fruit pulp extract.* PLoS One, 2013. 8(7): p. e70058.

669. Nwodo, U.U., et al., *Assessment of Tamarindus indica extracts for antibacterial activity.* Int J Mol Sci, 2011. 12(10): p. 6385-96.

670. Hasan, M., S. Rahman, and M. Akhter, *Antibacterial and cytotoxic activity of Tamarindus indica (Tamarind) seeds.* Journal of Bio-Science, 2019. 27: p. 83-88.

671. Nwodo, U.U., et al., *Acute toxicity and hepatotoxicokinetic studies of Tamarindus indica extract.* Molecules, 2011. 16(9): p. 7415-7427.

672. Chimsah, F., G. Nyarko, and A. Abubakari, *A review of explored uses and study of nutritional potential of tamarind (Tamarindus indica L.) in Northern Ghana.* 2020.

673. Komakech, R., et al., *Anti-inflammatory and analgesic potential of Tamarindus indica Linn. (Fabaceae): a narrative review.* Integrative Medicine Research, 2019. 8(3): p. 181-186.

674. Nutmakul, T., *Phytochemical and pharmacological activity of Tiliacora triandra (Colebr.) Diels.* Songklanakarin Journal of Science & Technology, 2021. 43(5).

675. Thong-Asa, W., et al., *Tiliacora triandra (Colebr.) Diels leaf extract enhances spatial learning and learning flexibility, and prevents dentate gyrus neuronal damage induced by cerebral ischemia/reperfusion injury in mice.* Avicenna journal of phytomedicine, 2017. 7(5): p. 389-400.

676. Chaveerach, et al. *Chemical Constituents , Antioxidant Property , Cytotoxicity and Genotoxicity of Tiliacora*. 2016.

677. Sireeratawong, S., et al., *Acute and subchronic toxicity study of the water extract from Tiliacora triandra (Colebr.) Diels in rats.* Songklanakarin Journal of Science & Technology, 2008. 30(5).

678. Ohashi, H. and Y. Iokawa, *A Revision of Uraria (Leguminosae) in Taiwan.* Taiwania, 2007. 52(2): p. 177-183.

679. Tu, P.-C., et al., *Bioactivity-guided fractionation and NMR-based identification of the immunomodulatory isoflavone from the roots of Uraria crinita (L.) Desv. ex DC.* Foods, 2019. 8(11): p. 543.

680. De Boer, H.J., C. Vongsombath, and J. Käfer, *A fly in the ointment: evaluation of traditional use of plants to repel and kill blowfly larvae in fermented fish.* Plos one, 2011. 6(12): p. e29521.

681. Manochai, B., et al., *Antioxidant activity and total volatile oil content of cassumunar ginger (Zingiber montanum Roxb.) at various rhizome ages.* Food Science and Biotechnology, 2007. 16(2): p. 290-293.

682. Hassan, M., et al., *Zerumbone and Kaempferol Derivatives from the Rhizomes of Zingiber montanum (J. Koenig) Link ex A. Dietr. from Bangladesh.* Separations, 2019. 6(2): p. 31.

683. Sharma, G., P. Chirangini, and K. Mishra, *Evaluation of antioxidant and cytotoxic properties of tropical ginger, Zingiber montanum (J. Konig) A Dietr.* Gardens' Bull Singapore, 2007. 59(1): p. 189-202.

684. Taechowisan, T., S. Suttichokthanakorn, and W.S. Phutdhawong, *Antibacterial and cytotoxicity activities of phenylbutanoids from Zingiber cassumunar Roxb.* Journal of Applied Pharmaceutical Science, 2018. 8(7): p. 121-127.

685. Koontongkaew, S., et al., *Safety evaluation of Zingiber cassumunar Roxb. rhizome extract: acute and chronic toxicity studies in rats.* International Scholarly Research Notices, 2014. 2014.

686. Devkota, H.P., et al., *Bioactive Compounds from Zingiber montanum and Their Pharmacological Activities with Focus on Zerumbone.* Applied Sciences, 2021. 11(21): p. 10205.

687. Saising, J., et al., *Ethnomedicinal Plants in Herbal Remedies Used for Treatment of Skin Diseases by Traditional Healers in Songkhla Province, Thailand.* Plants, 2022. 11(7): p. 880.

688. Mughal, S.B., et al., *Ethnobotanical literature survey of plants used to cure skin diseases.* World Appl Sci J, 2013. 27(4): p. 474-478.

689. Tundis, R., et al., *Potential role of natural compounds against skin aging.* Current medicinal chemistry, 2015. 22(12): p. 1515-1538.

690. Athar, M. and S.M. Nasir, *Taxonomic perspective of plant species yielding vegetable oils used in cosmetics and skin care products.* African journal of biotechnology, 2005. 4(1): p. 36-44.

691. Pupala, S.S., et al., *Topical application of coconut oil to the skin of preterm infants: a systematic review.* European Journal of Pediatrics, 2019. 178(9): p. 1317-1324.

692. Vala, G. and P. Kapadiya, *Medicinal benefits of coconut oil.* Int J Life Sci Res, 2014. 2(4): p. 124-126.

693. Chew, Y.-L., *The beneficial properties of virgin coconut oil in management of atopic dermatitis.* Pharmacognosy Reviews, 2019. 13(25): p. 24.

694. HOE, T.K., *The current scenario and development of the coconut industry.* 2018.

695. Papu, S., et al., *Medicinal values of garlic (Allium sativum L.) in human life: an overview.* Greener Journal of Agricultural Sciences, 2014. 4(6): p. 265-280.

696. Tesfaye, A. and W. Mengesha, *Traditional uses, phytochemistry and pharmacological properties of garlic (Allium Sativum) and its biological active compounds.* Int. J. Sci. Res. Eng. Technol, 2015. 1: p. 142-148.

697. Ballabh B, Chaurasia O. *Traditional medicinal plants of cold desert Ladakh—Used in treatment of cold, cough and fever*. Journal of ethnopharmacology. 2007;112(2):341-9.

698. Darbandi MP, Taheri J. *Using sulfur-containing minerals in medicine: Iranian traditional documents and modern pharmaceutical terminology*. Earth Sciences History. 2018;37(1):25-33.

699. Egharevba R, Ikhatu*a M. Ethno-medical uses of plants in the treatment of various skin diseases in Ovia North East, Edo State, Nigeria*. Res J Agric Biol Sci. 2008;4(1):58-64.

700. Kinda PT, Zerbo P, Guenné S, Compaoré M, Ciobica A, Kiendrebeogo M. *Medicinal Plants Used for Neuropsychiatric Disorders Treatment in the Hauts Bassins Region of Burkina Faso. Medicines (Basel, Switzerland).* 2017;4(2):32.

701. Mabona U, Van Vuuren S. *Southern African medicinal plants used to treat skin diseases*. South African Journal of Botany. 2013;87:175-93.

702. Pieroni A, Quave CL, Villanelli ML, Mangino P, Sabbatini G, Santini L, et al. *Ethnopharmacognostic survey on the natural ingredients used in folk cosmetics, cosmeceuticals and remedies for healing skin diseases in the inland Marches, Central-Eastern Italy.* Journal of Ethnopharmacology. 2004;91(2-3):331-44.

VITA

NAME	YE QIAOLING
DATE OF BIRTH	06 December 1984
PLACE OF BIRTH	Guangdong
HOME ADDRESS	9 Ratchaphruek Rd, Talat Phlu, Thon Buri, Bangkok 10600