58 Types of Malaysian Plants for Kidney Stone Remedies

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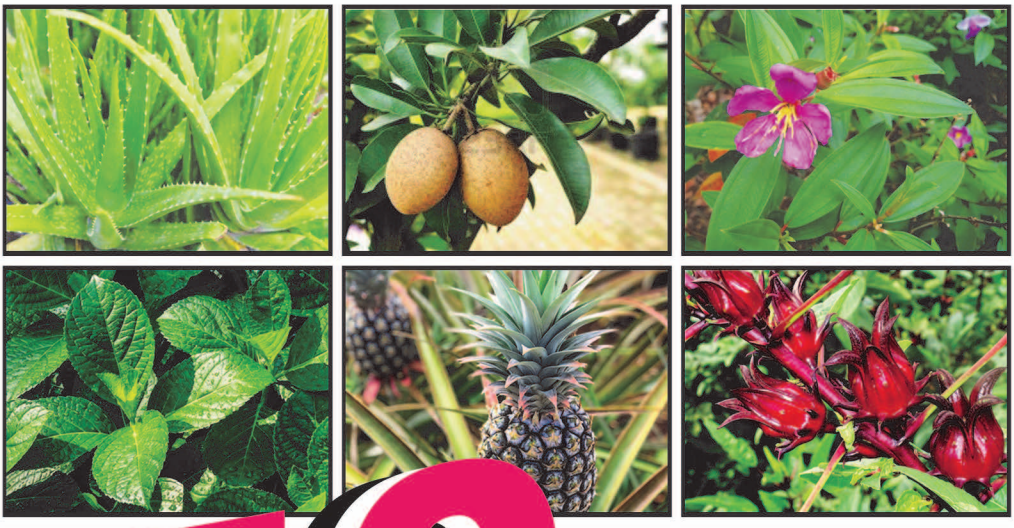
Abstract: Urolithiasis or kidney stone problem is one of the diseases that have a high prevalence and recurrence rate all over the world including Malaysia. Malaysia is well known to have rich sources of medicinal plants which have been used extensively as folklore remedies for the prevention and treatment of various health ailments since time immemorial. A survey conducted by the World Health Organization (WHO) stated that around 80% of the populations in developing countries are still depending on medicinal plants to treat various diseases due to their safety, cost-effectiveness, and readily available. This book presents a concise yet informative account of potential Malaysian plants that can be used for the treatment of urolithiasis in terms of their characteristics, traditional preparation and scientific studies that have been done previously.

This book has broad data obtained from various accessible library databases and electronic searches including PubMed, Google Scholar, Scopus, Science Direct as well as conference papers. From these findings, numerous articles on relevant antiurolithiatic activity of Malaysian medicinal plants were acquired and further reviewed. There are fifty-eight (58) types of Malaysian medicinal plants that have been recognised to have antiurolithiatic potential from traditional practices and scientific studies worldwide. Most of the Malaysian medicinal plants are traditionally prepared using the decoction method and possess good antiurolithiatic activities that have been proven scientifically. Aloe vera (lidah buaya), Manilkara zapota (ciku) and Melastoma malabathricum (senduduk ungu) are thought to be the most effective plants for treating urolithiasis with more than 90% inhibition and dissolution of calcium oxalate (CaOx) stones.

Keywords: Plant, remedies, medical, effective



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2022

First Published 2022

Perpustakaan Negara Malaysia Cataloguing - in - Publication Data

Norhayati Muhammad
58 Types of MALAYSIAN PLANTS for Kidney Stone Remedies / Norhayati Muhammad, Nur Fazira Abdul Rahim, Muhammad Ashraf Anas.
ISBN 978-967-2817-96-3
1. Medicinal plants.
2. Plants, Useful.
3. Urinary organs--Diseases--Alternative treatment.
4. Government publications--Malaysia.
I. Nur Fazira Abdul Rahim. II. Muhammad Ashraf Anas.
III. Title.
615.321

Published & Printed by:
Penerbit UTHM
Universiti Tun Hussein Onn Malaysia
86400 Parit Raja,
Batu Pahat, Johor
Tel: 07-453 8529 / 8698
Fax: 07-453 6145

Website: http://penerbit.uthm.edu.my
E-mail: pt@uthm.edu.my
http://e-bookstore.uthm.edu.my

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Majlis Penerbitan Ilmiah Malaysia
(MAPIM)

CONTENTS

LISTS OF SYMBOLS AND ABBREVIATIONS

cm	-	Centimetre
g	-	Gram
kg	-	Kilogram
L	-	Litre
m	-	Metre
mg	-	Milligram
mL	-	Millilitre
mm	-	Millimetre
AAS	-	Atomic absorption spectrophotometry
CaOx	-	Calcium oxalate
EG	-	Ethylene glycol
EG-AC	-	Ethylene glycol – ammonium chloride
EWSL	-	Extracorporeal shock wave lithotripsy
LDH	-	Lactate dehydrogenase
PNL	-	Percutaneous nephrolithotomy
SEM	-	Scanning electron microsopy
URS	-	Ureteroscopy
WHO	-	World Health Organization

ACKNOWLEDGEMENT

First and foremost, I would like to express my special gratitude to Nur Fazira Abdul Rahim, my Master student in the Food Technology programme at Universiti Tun Hussein Onn Malaysia (UTHM), Pagoh, Johor. She gave me the idea, opportunity and encouragement to write a very useful book on the study of Malaysian plants towards kidney stone problems in Malaysia. It can be referred to as a public health reference and as an educational health book.

I would like to acknowledge the Ministry of Higher Education Malaysia that sponsored this research under Fundamental Research Grant Scheme (FRGS) (FRGS/1/2017/WAB11/UTHM/03/1) Vote No. 1646. Also, special appreciation to Universiti Tun Hussein Onn Malaysia (UTHM) that partially funded this research under Postgraduate Research Grant Scheme (GPPS) Code H290.

I am also greatly indebted to all of the co-researchers of FRGS who are Professor Dato' Dr. Laily Bin Din and Associate Professor Dr. Nazlina Ibrahim from Universiti Kebangsaan Malaysia (UKM) as well as Associate Professor Ts. Dr. Mohd Fadzelly Bin Abu Bakar, Dr. Balkis A. Talip and Ts. Dr. Norazlin Abdullah from Universiti on Hussein Onn Malaysia (UTHM). With their advice and support, this book has been completed successfully.

Besides that, I would like to express sincere gratitude to the lab assistant in charge of Food Analysis and Food Instrumentation Laboratory at UTHM Campus Pagoh for permitting me to use all the equipment and apparatus needed to complete this book successfully. Also, a special thanks to Muhammad Ashraf Anas who has helped a lot with formatting and taking plant photographs for this book.

Special appreciation to communities in the area of Muar, Johor especially in Kampung Parit Haji Idris, Kampung Batu 20 Sengkang,

Kampung Simpang 5 Darat, Bukit Gambir, Parit Panjang Air Baloi and Telok Mas Melaka for permitting us to capture all those required plant photographs for the kidney stone remedies in this book. The cooperation provided by the local communities has greatly helped me to gather all the information needed in this book compilation.

Last but not least, I thank all who, in one way or another contributed to the completion of this book.

PREFACE

Urolithiasis or kidney stone problem is one of the diseases that have a high prevalence and recurrence rate all over the world including Malaysia. Malaysia is well known to have rich sources of medicinal plants which have been used extensively as folklore remedies for the prevention and treatment of various health ailments since time immemorial. A survey conducted by the World Health Organization (WHO) stated that around 80% of the populations in developing countries are still depending on medicinal plants to treat various diseases due to their safety, cost-effectiveness, and readily available. This book presents a concise yet informative account of potential Malaysian plants that can be used for the treatment of urolithiasis in terms of their characteristics, traditional preparation and scientific studies that have been done previously.

This book has broad data obtained from various accessible library databases and electronic searches including PubMed, Google Scholar, Scopus, Science Direct as well as conference papers. From these findings, numerous articles on relevant antiurolithiatic activity of Malaysian medicinal plants were acquired and further reviewed. There are fifty-eight (58) types of Malaysian medicinal plants that have been recognised to have antiurolithiatic potential from traditional practices and scientific studies worldwide. Most of the Malaysian medicinal plants are traditionally prepared using the decoction method and possess good antiurolithiatic activities that have been proven scientifically. *Aloe vera* (*lidah buaya*), *Manilkara zapota* (*ciku*) and *Melastoma malabathricum* (*senduduk ungu*) are thought to be the most effective plants for treating urolithiasis with more than 90% inhibition and dissolution of calcium oxalate (CaOx) stones.

We hope that this comprehensive information on Malaysian plants will be a useful reference for students, researchers, academicians and practitioners in the herbal industry as well as staff in agencies working for agricultural development. Plants are indeed an invaluable gift to mankind and can only leave one amazed and humbled.

INTRODUCTION

The kidney stone problem has become a worldwide problem that might be influenced by dietary and lifestyle habits (Romero, Akpinar & Assimos, 2010). It is regarded as the third most common ailment found in the urinary tract after urinary tract infections and prostate diseases (Tiwari *et al.*, 2012; Mazdak, Nikkar & Ghanea, 2007). It is estimated to occur in approximately 12% of the world population with a predominant recurrence rate of 70% to 80% in males while in the range of 47% to 60% for females (Tiwari *et al.*, 2012; Soundarajan *et al.*, 2006). These differences might be associated with the dietary habits of males who consume more meat than females, where excessive meat can lead to acidification of urine that promotes the stone formation (Liu *et al.*, 2018; Nasir, 1999).

In Malaysia, the kidney stone problem has shown a stable increment in the period of 1962 to 1966 until almost two decades later, from 1977 to 1981, which increased from 224.2/100 000 to 442.7/100 000 population respectively (Nouri & Hasali, 2018; Sreenevasan, 1990). Out of more than 4000 people experiencing to this disease, it occurred the most in Chinese (48%), followed by Malays (37.4%), Indians (13%), and other races (1.3%) (Sreenevasan, 1990). However, a more recent study in teaching hospitals in Kelantan, Malaysia reported that this disease is most prevalent in Malays with 91.1% (Nouri & Hasali, 2018). To the best of our knowledge, there are no current studies for urolithiasis problem and its development in Malaysia; the latest study was published in 1990 (Nouri & Hasali, 2018). Nevertheless, the subtropical climate in Malaysia tends to cause a high frequency of urolithiasis due to body dehydration caused by exposure to warm temperature thus resulting in the concentration of urine (Liu *et al.*, 2018; Hussein *et al.*, 2013).

In this modern era, urolithiasis is treated by surgical procedures such as extracorporeal shock wave lithotripsy (EWSL), ureteroscopy (URS), or percutaneous nephrolithotomy (PNL). However, these treatments may have some limitations such as having high cost and side effects; recurrence is also quite common (Devkar *et al.,* 2016). These procedures are practically suitable for stones that are larger than 5 mm and fail to pass through the urinary tract (Gilhotra, Mohan, & Christina, 2013; Butterweck & Khan, 2009). Drug therapies such as thiazides, allopurinol, and potassium magnesium citrate are used for secondary management of urolithiasis (Devkar *et al.*, 2016). However, the excessive use of these synthetic drugs can result in a higher rate of adverse drug reaction (Alok *et al.*, 2013). Hence, the development of herbal therapies is encouraging to return to naturally safe remedies.

Malaysia's tropical forest has a wide array of plant resources with a variety of species as it has suitable conditions for flourishing plant growth (Abu Bakar *et al.*, 2018; Adnan & Othman, 2012). It was estimated that there are approximately 15000 species of vascular plants with about 8300 species in Peninsular Malaysia and 12000 species in Sabah and Sarawak (Saw *et al.,* 2010). With these statistics, it is reported that around 1200 species are used widely for medicinal purposes and Malaysian's prevalence rate on herbal therapies is55.6% (Siti *et al.,* 2009; Kulip, 2003). Moreover, in Malaysia, many herbal remedies through the traditional knowledge of Malaysian communities may help in both the prevention and treatment of urolithiasis. Herbal remedies that have been used may possibly contain the potential to break the stone formation or prevent further stone formation. For example, the use of *Strobilanthes crispus* for healing kidney stone problems is practised by Malay communities in Negeri Sembilan, Malaysia (Ong & Norzalina, 1999).

SUMMARY OF SELECTED MALAYSIAN PLANTS FOR KIDNEY STONE REMEDIES

No.	Scientific Name	Vernacular Name
1	*Abrus precatorius*	Akar saga
2	*Abutilon indicum*	Kembang lohor
3	*Achyranthes aspera*	Ara sonsang
4	*Aegle marmelos*	Limau batu
5	*Allium cepa*	Bawang merah
6	*Allium sativum*	Bawang putih
7	*Aloe vera*	Lidah buaya
8	*Amaranthus spinosus*	Bayam duri
9	*Anacardium occidentale*	Gajus
10	*Ananas comosus*	Nenas
11	*Ananas nanus*	Nenas batu
12	*Annona muricata*	Durian belanda
13	*Apium graveolens*	Saderi
14	*Artocarpus altilis*	Sukun
15	*Averrhoa carambola*	Belimbing
16	*Basella alba*	Remayong
17	*Beta vulgaris*	Ubi bit merah
18	*Boerhavia diffusa*	Pokok labah labah
19	*Bryophyllum pinnatum*	Setawar
20	*Ceiba pentandra*	Kekabu
21	*Celosia argentea*	Balung ayam
22	*Centella asiatica*	Pegaga
23	*Citrus limon*	Lemon
24	*Cocos nucifera*	Kelapa
25	*Coleus amboinicus*	Bangun-bangun
26	*Colocasia esculenta*	Keladi cina
27	*Curculigo latifolia*	Lembah/lemba
28	*Cymbopogon citratus*	Serai makan

29	*Daucus carota*	Lobak
30	*Euphorbia hirta*	Ara tanah
31	*Ficus carica*	Tin
32	*Gomphrena globosa*	Bunga butang
33	*Gynura procumbens*	Sambung nyawa
34	*Helianthus annuus*	Bunga matahari
35	*Hibiscus rosa-sinensis*	Bunga raya
36	*Hibiscus sabdariffa*	Asam kumbang
37	*Imperata cylindrica*	Lalang
38	*Lactuca sativa*	Salad
39	*Lawsonia inermis*	Inai
40	*Leucaena leucocephala*	Petai belalang
41	*Mangifera indica*	Pelam
42	*Manilkara zapota*	Ciku
43	*Melastoma decemfidum*	Senduduk putih
44	*Melastoma malabathricum*	Senduduk ungu
45	*Mentha arvensis*	Pudina
46	*Mimosa pudica*	Semalu
47	*Moringa oleifera*	Kelor
48	*Musa paradisiaca*	Pisang
49	*Orthosiphon aristatus*	Misai kucing
50	*Peltophorum pterocarpum*	Jemerlang laut
51	*Phyllanthus niruri*	Dukung anak
52	*Piper sarmentosum*	Kaduk
53	*Punica granatum*	Delima
54	*Raphanus raphanistrum subsp. sativus*	Lobak putih
55	*Strobilanthes crispus*	Pecah beling
56	*Tamarindus indica*	Asam jawa
57	*Tradescantia zebrina*	Kura-kura air
58	*Zea mays*	Jagung

Abrus precatorius (Akar saga)



Plant Description

Vernacular name : Akar saga

English name : Jequirity bean, rosary pea, crab's eye

Scientific name : *Abrus precatorius*

Family : Fabaceae

Characteristics:

The leaves of rosary pea are alternate, pinnate and 3 to 5 cm long, feather like with small oblong leaflets. The fruit is a legume which has oblong and inflated shape and is about 3 cm long containing a hard ovoid seed that is about 1 cm long. The seeds are bright red in colour with a black spot at the base. The flowers are small and occur in clusters of 1 to 3 inches long, usually red to purple, or occasionally white. The stem is green, cylindrical, hairy, and often attains 1.5 cm in diameter. It also can turn dark grey, wrinkly, hairless, and slightly flattened when mature.

Habitat:

This plant grows mainly in moist tropical seasonal regions which include Malaysia.

Basella alba (Remayong)

Plant Description

Vernacular name : Remayong, gendola, tembayong

English name : Ceylon spinach, malabar nightshade, Indian spinach

Scientific name : *Basella alba*

Family : Basellaceae

Characteristics:

Basella alba is a short-lived, perennial climbing plant that produces stems up to 9 m long that scramble over the ground and twine into other plants for mechanical support. The stem is slender, smooth and green or purplish in colour. It has thick, semi-succulent, and heart-shaped leaves that are green or red in colour. The flowers are white and pink and produce black berry-shaped fruit.

Habitat:

B. alba grows well under full sunlight in hot, humid climates and in areas of moist tropics. In Southeast Asia, it is particularly popular in Malaysia and the Philippines.

C

Ceiba petandra (Kekabu)



Plant Description

Vernacular name : Kekabu, kapok

English name : Silk cotton tree

Scientific name : *Ceiba pentandra* (previously known as *Bombax ceiba*)

Family : Malvaceae (previously grouped in the family Bombacaceae)

Characteristics:

Silk cotton tree is a large deciduous tree that can reach a height of up to 70 m tall depending on the variety. It has a broad straight trunk and almost horizontally spreading branches that are supported by prickly buttresses at the base. The leaves are arranged alternately and comprise 5 to 11 leaflets which are oblong, lance-shaped, and hairless. It produces

Daucus carota (Lobak)

D

Plant Description

Vernacular name : Lobak

English name : Carrot

Scientific name : *Daucus carota*

Family : Apiaceae

Characteristics:

Daucus carota is a root vegetable that is usually orange in colour. It can grow up to 30-60 cm tall at the mature vegetative stage and can reach up to 120-150 cm tall when flowering. The leaves are hairless, green, and arranged alternately in a pinnate pattern that separates into thin segments. The flowers are small, dull white, and clustered in flat. The fruits are oval and flattened with short styles and hooked spines.

Habitat:

D. carota can grow in different types of soil and medium temperatures. In Malaysia, it grows in highland areas.

Traditional Preparation

Root: Effective remedies of kidney stone have been established by using *D. carota* root where one glass of the root juice is taken regularly for a fortnight to remove stone from the urinary tract (Prachi *et al.*, 2009).

Euphorbia hirta (Ara tanah)

Plant Description

Vernacular name : Ara tanah, gelang susu

English name : Asthma-plant

Scientific name : *Euphorbia hirta*

Family : Euphorbiaceae

Characteristics:

It is an annual and hairy herb that can spread its branches up to 50 cm in height. It can be reddish or purplish in colour according to the period of sunshine. The leaves are opposite, narrowly ovate in shape, dark green above, blotched with purple in the middle, and pale beneath as well as toothed at the edge. The flowers are small unisexual and greenish white in colour. The fruits are yellow, three-lobed, hairy, keeled capsules containing three brown, four-sided, angular, wrinkled seeds.

Habitat:

This plant is best cultivated in a light, well-drained and moderately rich loam in an open sunny location. It grows in human-disturbed areas including roadsides, fields, and yards.

Ficus carica (Tin)



Plant Description

Vernacular name : Tin

English name : Fig

Scientific name : *Ficus carica*

Family : Moraceae

Characteristics:

Figs are small, ordinarily deciduous shrub or tree that can grow 5 to 10 m in height. The leaf of the fig is dark green in colour, 3 to 5 lobed, thick, and can be up to 20 cm long. The fruit is 3 to 5 cm

Gomphrena globosa (Bunga butang)

Plant Description

Vernacular name : Bunga butang

English name : *Gomphrena globosa*

Scientific name : *Ficus carica*

Family : Amaranthaceae

Characteristics:

Gomphrena globosa is grown as a garden ornamental plant. The leaves are simple, oblong acute or obtuse in shape, and thinly hairy on both surfaces. The round-shaped flowers have a broad range of colour from magenta, purple, red, orange, white, pink, and lilac. It has brightly coloured bracts which can be dried without losing its vibrancy.

Habitat:

This plant is usually found in man-made or disturbed habitat. In Peninsular Malaysia, it is naturalised in waste places or grown as ornamental plant and flower heads used in everlastings.

Traditional Preparation

Flower: *G. globusa* flower has been used as traditional remedies for kidney stone complaints by using decoction and infusion preparation (Clement, Baksh-Comeau, & Seaforth, 2015).

GLOSSARY

Aqueous extract
- An extract prepared by evaporating a watery solution

Calcium oxalate
- These crystals are made from oxalate and combined with calcium

Decoction
- A liquid preparation made by boiling medicinal plants with water

Diuretic
- Promoting the flow of urine

Infusion
- The process of extracting chemical compounds or flavours from plant material in a solvent such as water, oil or alcohol

In-vitro
- Performed or taking place in a test tube, culture dish, or elsewhere outside a living organism

In-vivo
- Study on various biological entities that are tested on whole, living organisms or cells, usually animals, including humans, and plants, as opposed to a tissue extract or dead organism.

Juice
- A drink made from the extraction or pressing process of the natural liquid contained in fruit and herbs

Urolithiasis
- The process of forming stones in the kidney, bladder, and/or urethra (urinary tract)

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