The Coloured Atlas of Medicinal and Aromatic Plants of Jordan and Their Uses (Volume One)

The Coloured Atlas of Medicinal and Aromatic Plants of Jordan and Their Uses (Volume One)

By

Jamal Ragheb Said Qasem

Cambridge
Scholars
Publishing

The Coloured Atlas of Medicinal and Aromatic Plants of Jordan and Their Uses (Volume One)

By Jamal Ragheb Said Qasem

This book first published 2020

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Copyright © 2020 by Jamal Ragheb Said Qasem

All rights for this book reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

ISBN (10): 1-5275-4559-8
ISBN (13): 978-1-5275-4559-5

DEDICATION

- In the name of God, who created, invented and sustained all these wonderful, valuable, diverse plant species, His mercy and His blessing, and who said “We will show them our signs in the horizons and within themselves until it becomes clear to them that it is the truth. But is it not sufficient concerning your Lord that He is, over all things, a Witness?” (Sura Fussilat 041-053).
- To my homeland and to all who bless its soil.
- To the memory of my parents, who made sacrifices for my education and taught me that the land is faith and life.
- To all my grandchildren, to learn and to know the value of the source and the product.

CONTENTS

Volume One

PREFACE

Authoring a reference book on an important subject utilized daily by the public, traders, readers and researchers is not an easy task in the absence of well-planned and well-conducted academic research and real scientific information. A huge number of reference books and an overwhelming amount of articles on medicinal and aromatic plants are available in local markets, bookshops, libraries, and many herbal stores and shops specializing in folk medicine trades and preparing, formulating and selling these plants or their materials; some are of an acceptable history and accumulated experience while others are recently founded and have little or no experience but are rather invested in this field. All these sources mentioned, in addition to the public's inherited experience on the utilization of these plants in folk medicine, herbalism and traditional herb practices and their knowledge on plant-based medications that have been passed down from one family to another within communities, have created a great demand for knowledge on these species' use in medication. However, many of the available reference works have been gathered, compiled or prepared by non-specialists, which casts some doubt on their information, which may negatively add to our knowledge or even be confusing. In addition, many authors, researchers or project leaders in this field of science are either not specialists or are unfamiliar with medicinal and aromatic plants, and thus their results and reports may lead to random public use of these species in folk medicine, which could result in permanent illness or death.

Aromatic and medicinal plants are renewable resources for drugs, the medicinal industry, cosmetics, perfume and pesticides. Many species are toxic if used fresh or in crude forms, or may be so at a certain stage or under specific conditions. Others are extremely poisonous when internally taken, used in high doses, or when repeatedly applied or utilized for a long period. Some are also effective for curing local inhabitants but are not so for foreigners, hence the statement of Hippocrates that one should "treat or cure each patient by plants of his own land which are most appropriate to restore his health and recovery from illness". The active constituents of these plants are not produced or synthesized, but are only available under certain conditions or at a certain time of the day, season or year and only in certain plant part/s.

As an author, agriculturalist, weed science specialist, lecturer on medicinal and aromatic plants, and researcher, I have reviewed the literature and gathered exact and correct information on these important species in drugs and in the industry, as reported and confirmed by different authors. However, many of the reported species in this book have not been fully researched or studied and their active constituents are still unknown. I should indicate that I am not the author who examined or proved species' effectiveness and their safe use against the illnesses and diseases reported in this book. Therefore, self-medication using these species or in folk medicine is the responsibility of the user, who should always seek medical advice from a specialized practitioner. The book is an important source of scientific information, but is certainly not a guide for self-medication. It emphasizes wild grown species, which hence are unfamiliar to the public; many cause health difficulties if misused but are important for investment and the ecosystem. However, with the world's increasing interest in natural products and herbalism, medicinal and aromatic species gain priority as renewable resources for such natural chemicals, and more research and development is needed.

Finally, I do not claim that the species reported are all that occur in Jordan's flora, especially in the absence of actual academic research or survey studies. I should indicate that many species occurring in local habitats lack basic information with regard to their biology, ecology and importance, and are only listed as wild species of an unknown value or as common weeds. However, this atlas introduces 769 plant species (209 are cultivated and 560 are wild grown) occurring in Jordan belonging to 119 plant families, and all are listed with necessary information. The atlas presents a full colour photo for each species for readers to become acquainted with the species presented and shows their values to the national economy and environment.

Jamal R. Qasem

ACKNOWLEDGEMENTS

First, thanks to God for completing this reference book and making it into a reality for the scientific community, students, researchers and interested public readers in this important branch of science. Creation, health, toxicity, wellness, sickness, recovery, drugs and cures all are from and by God, and must lead any who deeply think on creation to become a believer. The Holy Qur'an says, "Those who remember Allah while standing or sitting or [lying] on their sides and reflect on the creation of the heavens and the earth [and say] "Our Lord, You did not create this aimlessly; exalted are You [above such a thing]; protect us then from the punishment of the Fire"" (Ali-Imran 003-191). I would like to express my gratitude to the Deanship of Academic Research at the University of Jordan for approving and funding this project. I also thank Miss Hadeel Bdair and Mrs. Dina Al-Hattab for their part-time technical assistance during the early preparation phase of this project; thanks are also extended to Mr. Madi Al-Abbadi for joining me on field trips, Mr. Alex Monaghan for proof-reading the manuscript and the Cambridge Scholars Publishing family for printing and publishing the book. Thanks to my wife and sons who supported and encouraged me throughout the whole period. Finally, to all friends and colleagues who encouraged me to complete this project and highly valued its importance, I say thanks, and to others who thought its completion would not be an easy task, or even an impossible one, I say your feelings were behind my persistence and insistence to complete this work. Having realized the merits of its publication, I offer it to all who are homesick and in love with scientific research, who devote their lives to their homelands, and who believe in history and originality.

INTRODUCTION

The history of utilizing plants for their healing properties is as old as man himself. The first man on earth was searching for plants that would fulfil his needs of food, shelter, medicine and beauty then, later, as feed for his animals. He recognized useful plants, and protected and increased their number, productivity and/or the area they occupied, while other plants of unknown values or which were poisonous were ignored or severely controlled. However, in the absence of historical documentation on the exact date, the grave of a Neanderthal man buried 60,000 years ago reveals that the connection between plants and human health has existed for thousands of years. Such a link has also been confirmed through the drawings on graves of Ancient Egyptians and documented in medical hieratic papyri. Mesopotamian prescriptions and the medicinal substances of the Babylonians and Sumerians are available from the era of Hammurabi's laws on plants' uses in medication with full details on diseases, plants' doses, formulations and the time at which these were used. Some species, however, were also found to have grown in biblical gardens. The great historical documents on medicinal plants' uses in human medication have also been found in China, Greece, India and some European countries. However, many of the plant species used in history for healing certain ailments or against certain diseases have also proved effective against the same diseases in modern medicine; some formulations have been changed, while others are still used as they were when they were first prescribed.

Plants are a renewable resource for human drugs and veterinary medicine. Medicinal and aromatic plants represent a significant component of the natural ecosystem and agro-ecosystems, play an important role in industry and add significantly to a nation's economy. Many are used as drugs and drug additives in perfumes, cosmetics, food, flavouring agents and spices or as a source of natural pesticides. With the trend towards rapid urbanization, people became more concerned about their food, drinks, drugs and environment, and more interested in a safe habitat, a clean environment, a hazard-free life and their welfare. Although many countries have traditionally adopted a natural system for their food and drug production, and folk medicine is widely practised, others are more restricted and dependent on synthetic or manufactured materials as a main source of food and products. However, with better awareness of the problems that the second system created for human health and the environment, natural products became more attractive for health, industry, and investment in food and drugs, and thus more attention is given to protecting the natural ecosystem. In this context, using natural resources and organic food production in the drug industry is highly respected. Considering the above-mentioned reasons, and the possible risk in using synthetic drugs and other chemicals on human health and the environment, people worldwide have turned back to nature's chemicals. While 400,000 chemical compounds are estimated to occur in plants, only 10,000 have been isolated and identified as secondary metabolites of different uses. This huge number of plants' natural chemicals could greatly serve and fulfil humanitarian needs in all fields.

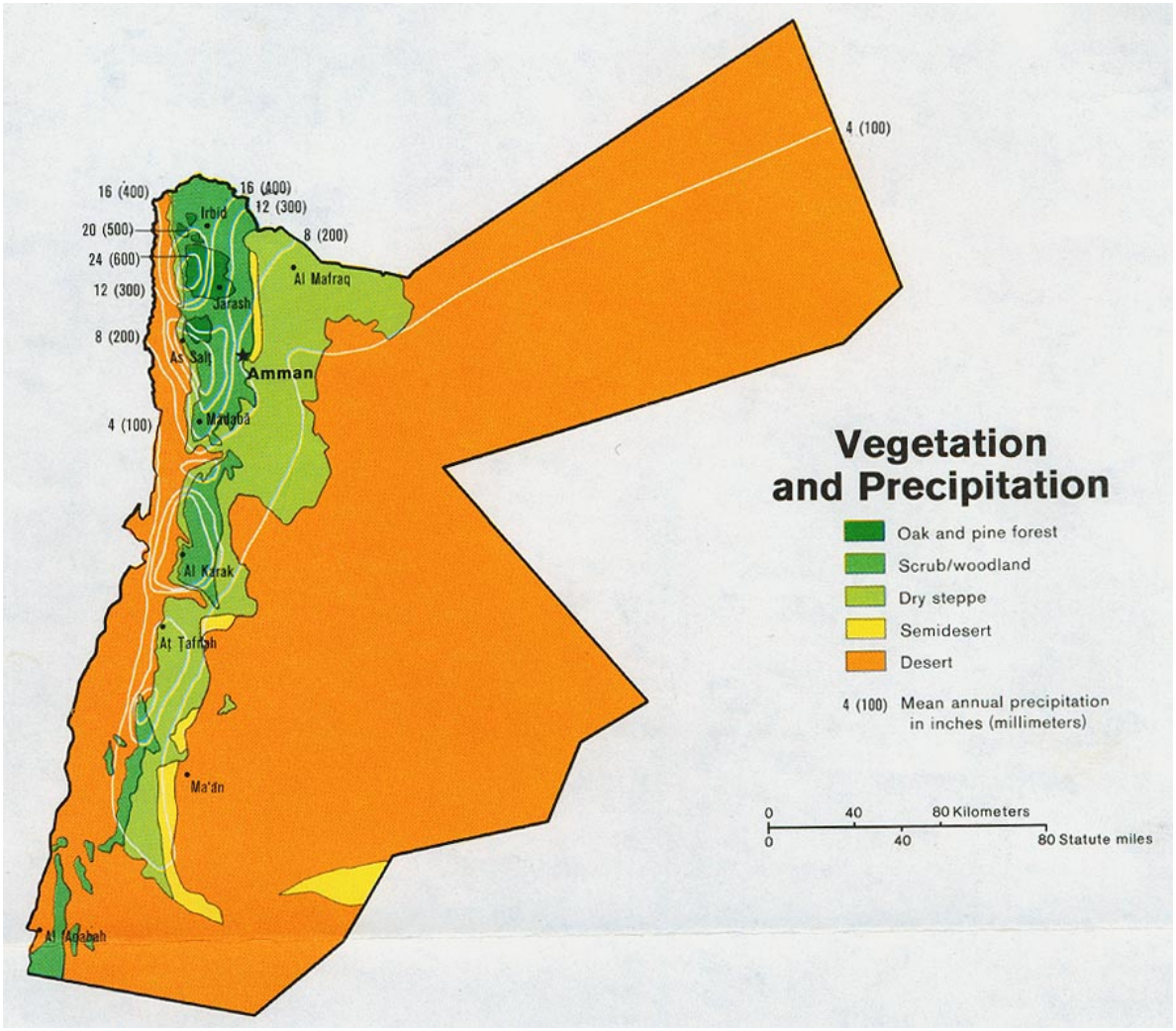
In Jordan, almost 2,500 plant species have been reported to occur in the country, accounting for about 1% of the total number of plant species known in the world. Among these, 350 to 500 are regarded as useful in medicine and cures, and many of these are also used in food and for other purposes. The main issue is the absence of a drug industry and the complete reliance on imported chemical drugs and pesticides. This declined levels of interest in these species and investment in their production. In addition, harvesting, heavy grazing, war, drought, salinity, low rainfall and housing construction have created unfavourable conditions for the plant population's expansion in natural habitats and/or their cultivation. All have contributed to placing many plants in endangered or threatened categories despite the diverse environmental conditions, extending from tropical and sub-tropical to the Sahara-Arabian, that create ideal environments for a wide diversity of such species or others in the country.

The present book is divided into three volumes: the first is devoted to cultivated plant species while the second and the third cover wild grown species. Plants are arranged alphabetically based on their scientific names, regardless of other factors. It is a reference book that includes basic information on medicinal and aromatic species in Jordanian flora, emphasizing their importance in the drug industry and the natural ecosystem. It is of value for the general public, folk medicine practitioners and the drug and chemical industry. The scientific merit of this publication is clear for certain university departments, including medicine, pharmaceutical, scientific and agricultural faculties.

I have full faith in the work and hope that the book highlights a number of medicinal and aromatic plant species in Jordan and provides interested people with useful knowledge on each. Finally, thanks to the Lord who greatly helped me in finding, identifying, directing and finishing this work and, above all, who created these beautiful plants that maintain their secret curing recipes for many difficult human and veterinary diseases that specialists have no solution for and which are only stored in these peaceful, sensitive, and sometimes endangered or threatened plants. The book emphasizes wild species unfamiliar to the public that have been ignored or severely prevented from sowing their seeds or producing propagules to maintain their genetic lines and exist in nature. Thanks to the creature that organized and managed the life of all living organisms to exist and have strong ties to fulfil the needs of all. Man does not know all

benefits of plants; many are still hidden and are only discovered through research, and therefore each species may be regarded as a natural pharmacy that includes all drugs necessary for humans. Each species has some sort of beauty and it is our goal to search for and discover them. However, man, who we started with, is himself responsible for the eradication, killing and disappearance of these species in his habitat, which should have instead been protected, increased and developed.

The author



Map of Jordan showing the country's biogeographical regions and vegetation types (source: lib.utexas.edu)

With each sunrise, a new day starts that brings a huge amount of knowledge for those who want to learn.

VOLUME ONE

CULTIVATED MEDICINAL AND AROMATIC PLANTS OF JORDAN

- **Arabic name**: Bamia, Bamia'a
- **Scientific name**: *Abelmoschus esculentus* (L.) Moench
- **Common name**: Okra
- **Family name**: Malvaceae
- **Growth habit**: Herb
- **Life cycle**: Annual
- **Part/s used**: Fruits
- **Chemical constituents**: Mucilage, carbohydrates 8.3%, protein 2%, ash 1.1%, fat 0.2%, fibres 1.4%, mineral elements including calcium and magnesium, and vitamins A, C, and B_6.
- **Pharmacological action**: The fruits are nutritive, anti-diabetic, anti-oxidant and anti-bacterial. Mucilage is used as a suspending agent in drugs, especially in paracetamol.
  In folk medicine, a fruit infusion is taken to reduce blood sugar level in diabetics. A decoction of small fruits treats inflamed mucus tissues, mainly of the respiratory system, associated with severe secretions. Okra juice cures throat and pharynx ulcerations associated with coughing. Fruits and leaves decoctions are used for urinary system troubles such as urination ailments and other problems including syphilis and gonorrhoea. Leaves and roots cure cuts. Okra juice is effective against diarrhoea, fever, intestinal ailments, and itching, and is a skin emollient. Leaves are used for inflammations and fruits are eaten for strong seminal secretions. Roasted seeds are diaphoretic and used in protecting against muscle spasms. Okra decoctions are used to treat fevers, headaches and arthritis. Since okra is rich in fibres, it absorbs moisture and improves deposition and thus is effective as an anti-diarrhoeal and anti-constipation. Mucilage binds with cholesterol and gallbladder acids and is disposed of with faeces. Okra acts by preventing sugar absorption by the intestines and thus reduces its blood level. Mucilage is a laxative and facilitates the deposition of waste materials. It is believed that okra is an emollient, preventing boils, sores, acne and skin ruptures.
- **Other uses**: It is a vegetable crop, and the fruits are cooked in different forms and eaten. Stem fibres and fruits are used in the paper and fabric industries. Okra seeds are substituted for coffee beans.
- **Caution**: Okra causes stomach debility or weariness for some people and vomiting. It has been reported that methanolic extracts of okra fruits constricted the sexual systems of mice, and histological studies showed a reduction in prostate gland weight in male mice, indicating the harmful effect on mice's fertility.

.

Okra field

Okra fruits

- **Arabic name**: Tanoob, Shooh
- **Scientific name**: *Abies cilicica* Ant.et. ky.
- **Common name**: Cilician Fir
- **Family name**: Pinaceae
- **Growth habit**: Tree
- **Life cycle**: Perennial
- **Part/s used**: Essential oil and terminal portions of young leafy branches.
- **Chemical constituents**: Volatile oil (3%) as a source of industrial camphor, borneol citrate, camphen, alpha-pinene, beta-pinene, dipentene and santene. Leaves contain terpenes, vitamin C and a fixed oil. Seeds contain vitamin E.
- **Pharmacological action**: Oil inhalation is a cure for throat catarrh. Camphor is used for psychological diseases, as a sedative, and improves and stimulates cardiac functions. Externally, the herb is used as an anti-rheumatic and anti-arthritic. Terpene is a skin irritant, stimulates the blood cycle, is an antiseptic, expectorant, and nerve tonic, and is useful in curing gout and rheumatism. The decoctions of young leaves and buds are anti-scorbutic.
- **Other uses**: It is a perfume and a fresh spicy scent. It provides a festive aroma for a freshly cut Christmas tree.
- **Caution**: It can be a skin irritant and causes arthritis if its perfume is undiluted.

Cones

- **Arabic name**: Acacia
- **Scientific name**: *Acacia cyanophylla* Lindl.
- **Common name**: Blue-Leaved Wattle
- **Family name**: Leguminosae / Fabaceae
- **Growth habit**: Shrub
- **Life cycle**: Perennial
- **Part/s used**: Leaves, flowers, pods, and bark.
- **Chemical constituents**: Flavonoids such as quercetin and kaempferol, flavonols, phenolic compounds in leaves including gallic, protocatioic, chlorogenic, p. hydroxybenzoic, p-coumaric, syringic, and vanillic acids. In flowers, quercetin, isosalipurposide, and naringenin. Tannin in the bark. Leaves consist of spirostane saponin and biflavonoid glycosides. The plant contains volatile oils and gum. *Acacia* has also been reported as rich in phytochemicals such as cardiac glycosides, cylitols, amines, alkaloids, fatty acids, terpenes, hydrolysable and condensed tannins, non-protein amino acids, fluoroacetate and phytosterols. However the presence of certain phytochemical contents such as glucosinolates, naphthoquinones, coumarins, anthraquinones, lignans, acetylenes, stilbenes and atypical fatty acids are reported to be less within the *Acacia* genus as well other mimosoid legumes.
- **Pharmacological action**: The leaf extract has antioxidant and anti-acetylcholinesterase activity. Similarly to many other plant species belonging to the same genus, it has medicinal values in cases of gonorrhoea, dysentery and bloody diarrhoea. The saponin and biflavonoid glycosides are cytotoxic.
- **Other uses**: The flowers are cooked since they are rich in pollen grains. A strong acidic gum released from the bark seems to have potential uses in food, pickles and other food stuffs requiring a sour taste. A yellow pigment is obtained from the flowers and a green one from the pods. The plant is grown in gardens as an ornamental and in loose-soiled hills against soil erosion. It is also grown on field borders as a wind breaker, and can also be used for the rehabilitation of dry and semi-arid regions. It is used as fuel.
- **Caution**: No reports.

- **Arabic name**: Anbar, Fittna, Acacia
- **Scientific name**: *Acacia farnesiana* (L.) Wild
- **Common name**: Sweet Acacia, Popinac, Sponge Tree, Needle Bush
- **Family name**: Leguminosae / Fabaceae
- **Growth habit**: Tree
- **Life cycle**: Perennial
- **Part/s used**: Flowers and fruits.
- **Chemical constituents**: The acacia essential oil consists of farnesol, geraniol, and linalool. Pods contain tannins. The plant has saponins, coumarins, carbohydrates and/or glycosides, unsaturated sterols and/or triterpenes, mucilage, alkaloids, nitrogenous bases, flavonoids and cyanogenic compounds. It also consists of phenols and is regarded as a source of pentosans and furfural. Seeds contain diterpene glycoside. The pods yield kaempferol 7-glucoside, kaempferol 7-galloyl glucose and polyphenols identified as Et gallate, Me gallate, gallic acid, m-digallic acid, catechol, ellagic acid, lipid, aromadendrin, and maringenin. Leaves have a high content of cholesterol in lipids.
- **Pharmacological action**: Flavonoids and flavones are used for the prevention and treatment of cognitive decline, age-related memory impairments and skin diseases. The plant is active against one or more sarafotoxins in snake venom. The pod's extract has hypoglycaemic activity. The ointment made from pods is used for eczema and skin profligacy between toes. The oil is used in perfumery and for rheumatic symptoms and chest ailments. Leaves treat skin diseases. Bark and leaf extracts are used for malaria and roots and bark for diarrhoea and skin diseases.
- **Other uses**: It is used for colour firmness and stability in the dyeing of cotton textiles, and the flower oil is used in fragrances of different types. The plant is an aromatic and industrial species, and is also used as a fence on farms and as an ornamental.
- **Caution**: No reports.

The whole plant

- **Arabic name**: Adhatoda
- **Scientific name**: *Adhatoda vasica* Nees
- **Common name**: Malabar Nut
- **Family name**: Acanthaceae
- **Growth habit**: Shrub
- **Life cycle**: Perennial
- **Part/s used**: Leaves, roots, flowers, and fruits.
- **Chemical constituents**: Alkaloids and an unknown volatile oil. Mature leaves are rich in carotene and vitamin C.
- **Pharmacological action**: The plant is a cure for chest problems, bronchitis, malaria, tuberculosis and as a vermifuge. The leaves are used for rheumatism.
- **Other uses**: It is an ornamental plant in gardens and along pavements. It has insecticidal activity.
- **Caution**: The plant is not suitable for use by pregnant women.

The whole plant

- **Arabic name**: Kastana'a Al-Hussan
- **Scientific name**: *Aesculus hippocastanum* L.
- **Common name**: Horse Chestnut
- **Family name**: Hippocastanaceae
- **Growth habit**: Tree
- **Life cycle**: Perennial
- **Part/s used**: Roots, flowers, seeds, bark, and fruits.
- **Chemical constituents**: Saponins, tannins, antidote substances, anti-inflammatories, alkaloids, and glycosides, among which aesculin is the most toxic.
- **Pharmacological action**: It is an anti-inflammatory, anti-tumour, anti-astringent and anticoagulant. Seed preparations are used for haemorrhoids, varicose veins and, externally, as an ointment added to bathwater.
- **Other uses**: The plant is used as an ornamental tree on streets.
- **Caution**: Fruits (nuts) are toxic, and therefore should be removed when the plant is used in large quantities in medication.

- **Arabic name**: Agave Amreeki, Agave
- **Scientific name**: *Agava americana* L.
- **Common name**: Sisal, Agave, Century Plant
- **Family name:** Agavaceae or Amaryllidaceae or Asparagaceae
- **Growth habit**: Succulent plant
- **Life cycle**: Perennial
- **Part/s used**: All plant parts, leaves, roots, and plant sap.
- **Chemical constituents**: Glycosides, agavosides A, B, and C, steroidal saponins, spirostanol, agavesaponin C and agavesaponin D, sapogenin, saponins, hecogenin, and steroidal hormones.
- **Pharmacological action**: The plant is used as a traditional herbal remedy, which is only prepared from the sap. It is a demulcent, laxative and antiseptic. It is diuretic and emmenagogue. It is also used as an anti-scorbutic; the extracted substance from certain species can be transformed into cortisone.
- **Other uses**: Plants' raw materials are used in manufacturing packaging or paper boxes. The plant is an ornamental.
- **Caution**: Eating the plant may cause some minor symptoms such as rashes, vomiting or diarrhoea. The ingestion of small amounts may not cause any symptoms. Exposure to the plant's juice or sap or a puncture wound from the thorns may produce a skin rash or irritation. Skin wounds from some of these plants can be extremely painful, causing large blisters and skin burning.

- **Arabic name**: Agave
- **Scientific name**: *Agava sisal* L.
- **Common name**: Sisal, Agave
- **Family name**: Agavaceae or Amaryllidaceae or Asparagaceae
- **Growth habit**: Succulent
- **Life cycle**: Perennial
- **Part/s used**: Leaves, roots, and leaf sap.
- **Chemical constituents**: Plant leaves contain protein, fibre, ash, fats, carbohydrates, sapogenins, steroidal sapogenins and sapogen materials including tigogenin, Ne-tigogenin and hecogenin. In addition, agave contains Ne-tigogenin, sisalogenin, gloriogenin, gentrogenin, yamogenin and diosgenin. It also contains vitamins A, B_1, C, D, K, anordin materials and dinordin of sterility, and has anti-fertility and anti-conception effects.
- **Pharmacological action**: The plant is a source of cortisone and steroidal hormones. It is an antiseptic, diuretic, laxative, wound-healing, anti-inflammatory, anti-fever, digestive, anti-constipation and anti-dysenteric. The plant extract has antimicrobial and antibacterial activities that harm the digestive system. It was previously used to treat syphilis, tuberculosis, and liver diseases, and it helps protect against scorbutic disease. It is used externally to cure burns. The infusion of agave fibre prevents head skin infections and alopecia. Prosteroidal hormones extracted from plant leaves are the core unit of cortisone and carry its properties. The plant has anti-arthritic activity and cytotoxic properties. It is also used for gout, rheumatism and as a demulcent.
- **Other uses**: The plant is used to prepare a special Mexican drink. It is also used as an ornamental plant in homes and public gardens.
- **Caution**: Ingesting the plant may cause some minor symptoms such as rashes, vomiting or diarrhoea. Small amounts may not cause any symptoms. Exposure to the plant's juice or sap may produce a skin rash or irritation. Skin wounds from some of these plants can be extremely painful, causing large blisters and skin burning. The plant should never be used by diabetics or hypertensive patients. Its formulations should be only used under medical supervision and when necessary, especially by women before and during pregnancy. It should not be used by growing children.

- **Arabic name**: Lisan Al-Teer, Shajarat Al-Janah, Shajarat Al-Sama, Shajarat Allah
- **Scientific name**: *Ailanthus altissima* (Mill.) Swingle
- **Common name**: Tree of Heaven
- **Family name**: Simaroubaceae
- **Growth habit**: Tree
- **Life cycle**: Perennial
- **Part/s used**: Bark and root.
- **Chemical constituents**: Ailanthone, ailanthonon, quassin, ailanthinone, chaparrine, and ailanthinol B (quassinoid derivatives), the alkaloid 1-methoxycanthin-6-one is not active, indole alkaloids with canthine-6-one and beta-carboline structures, alkaloids, tannic acid, and resin.
- **Pharmacological action**: The plant is a tonic, anthelmintic, antiseptic, purgative and cardiotonic. It acts as an anti-malarial, anticancer, anti-dysentery and anti-diarrhoeal. The bark is used for worms, gonorrhoea, asthma and as an anticonvulsant. Infusions from the leaves and bark are used against intestinal parasites and the powder of dry leaves is used to treat haemorrhages.
- **Other uses**: The plant's bark extract is strongly phytotoxic and contains ailanthone as one of the major herbicidal compounds, with strong herbicidal effects in the field. There is a possible use of root extracts or active plant constituents as natural herbicides. It is a street tree plant. Resin oil is used in industry and for making certain types of varnish.
- **Caution**: The plant should never be used in medication except under medical supervision.