ENCYCLOPEDIA
OF NATIVE & NON-NATIVE PLANTS IN EASTERN ARABIA

VOLUME 1 • TREES

Developed By:

GORD
المنظمة الخليجية للبحث والتطوير
GULF ORGANISATION FOR RESEARCH & DEVELOPMENT

In Collaboration With:

دولة قطر
State of Qatar
وزارة البلدية والبيئة

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DISCLAIMER

The Gulf Organisation for Research & Development (GORD) bears no responsibility for any action taken or decision made based on the information contained herein or inaccuracies presented in this book. Whilst utmost care has been taken to ensure a high degree of accuracy, readers are invited to notify of any discrepancies.

The economic, landscape, environmental and medicinal uses of each plant are wide and varied. Uses of different species may differ in various parts of the world. Therefore, GORD does not recommend these plants for food, medicinal and/or other uses, and offers no recommendation as to the preparation of these plants. Although scientific research has been conducted on their medicinal uses, some plants are dangerous and may lead to harmful effects if not used with sufficient precaution. GORD will not be liable for any accident resulting from the misuse of plants mentioned in this book.

MESSAGE FROM MME

His Excellency
Abdulla bin Abdulaziz
bin Turki Al Subaie

Minister of Municipality
and Environment

Against the backdrop of economic diversification and ongoing growth, the State of Qatar has experienced a rapid influx of expatriates over the last few years. This has naturally spurred unprecedented urban development accentuated by the construction of smart cities and districts. To meet the growing urban needs while also meeting the State's sustainability commitments, it was vital to have a strategy that ensured responsible development of urban spaces without compromising the needs of present and future generations.

Accordingly, guided by Qatar National Vision 2030, the Ministry of Municipality and Environment (MME) developed Qatar National Development Framework (QNDF) which received approval from the Council of Ministers by Decree No. (77) in April 2014, and was ratified by His Highness The Emir in December 2014. In line with QNDF, MME has more recently outlined its short-, medium- and long-term goals detailing MME's aspirations for 2030 and priorities for 2022. Alongside food security, agriculture, environment and services, a key area addressed in this strategy is urban planning and beautification.

In the context of urban development, MME's sincere efforts resonate Qatar's national vision to transform the country into an advanced state marked by sustainable development, economic diversification, knowledge based economy and high-quality living standards for its residents. Therefore, our strategy on urban development encompasses beautification of cities while also expanding green spaces outside the metropolitan centers. Urban green spaces such as parks, greenbelts across neighborhoods and sports fields do not only fight climate change but also promote the health and wellbeing of residents by providing them with outdoor spaces for physical activity, leisure and relaxation. Outside the metropolitan areas of Qatar, these greenbelts are planned to be expanded for agricultural activities to secure future food supply as prescribed in Qatar National Food Security Programme (QNFSP).

To achieve these aspirations and priorities, it is imperative to have the knowledge bank that empowers us to select and grow the right species of plants for urban landscaping and agricultural expansion. In this context, the *Encyclopedia of Native & Non-Native Plants in Eastern Arabia* has emerged as a much-needed reference tool for all concerned authorities working towards Qatar's sustainable transformation.

We congratulate the Gulf Organisation of Research & Development (GORD) for developing this book which contains 6 volumes covering 800 plant species, and is clearly an asset for individuals and organizations belonging to a wide spectrum of fields and geographic locations. As we look forward to benefitting from this book of knowledge, we encourage local, regional and international organizations to take advantage of the years of research and analyses encapsulated in this encyclopedia.

MESSAGE FROM GORD

Dr. Yousef Mohammed Alhorr

Founding Chairman of Gulf Organisation for Research & Development

We work from a place of hope – hope of crafting a green legacy for present and future generations. At GORD, we drive the transformation of societies, industries and the built environment by influencing corporate ethos, fostering innovation and developing capacity to enable low-carbon sustainable growth.

Five years ago, we started working on the *Encyclopedia of Native & Non-Native Plants in Eastern Arabia* with an intention of providing a handbook about all existing flora in the region. In the beginning, the idea of assembling key information about all species in one place was ostensibly straightforward. This, however, was a passing delusion. As we delved deeper into the research corpus available on relevant plant species, what began as a booklet transformed into an extensive encyclopedia. With its thorough approach discussing all species from diverse angles with numerous applications, the book in its final shape is undoubtedly the most comprehensive scientific archive conceived and developed about plants existing within the Eastern Arabian habitat.

The *Encyclopedia of Native & Non-Native Plants in Eastern Arabia* features an enumeration of plant species arranged systematically with descriptive details such as its conservation status, worldwide distribution, nativity to the region, lifespans, adaptability, cultivation and forms. It compiles the applications of each plant listed. With economic, medicinal, landscaping and environmental uses consolidated in one place, the book serves as a reference tool for professionals dealing in diverse sectors such as health, medicine, engineering and architecture, to name a few.

A perennial theme traversing across the entire work is that of sustainability, which also sits at the core of GORD's philosophy. Tying together flora with sustainable built environment, the compendium explores the environmental impacts of all listed species while also investigating their suitability for landscaping purposes in Eastern Arabia's hot and arid climate. From a practical standpoint, it addresses key concerns of architects, landscape engineers and designers struggling to find the right fit between a project's aesthetic appeal and its environmental repercussions. It is designed to facilitate readers in overcoming the inevitable challenge of achieving optimum landscaping without draining our earthly reserves, such as water. The publication, hence, is suited for use as a source book for landscaping in ongoing and future projects.

A great deal of effort has gone into the production of this book, but the true fruit of our labor will be seeing the community benefiting from this unprecedented piece of work. It is, hence, our sincere hope for readers to put this publication into constructive use.

MESSAGE FROM MME'S PUBLIC PARKS DEPARTMENT

Mr. Muhammad Ali Al-Khoury

Director of Public Parks Department at the Ministry of Municipality and Environment

In line with Qatar National Vision 2030, the Ministry of Municipality and Environment represented by the Public Parks Department, is keen to expand the green area by nurturing trees and plants across Qatar.

The ministry is working towards the country's environmental sustainability goals through several measures and initiatives, among which is "Plant Million Trees". The rationale behind this project is simple. While the world continues its race against rising global temperatures, it is important to note that answers to climate crisis partly remain in simplest solutions like afforestation. When grown in substantial numbers, trees have the potential to slow down global warming by reducing CO_2 emissions. In addition, the initiatives of Public Parks Department of MME are of cultural and vital importance as they are contributing to achieve environmental goals while also promoting community awareness and education about environmental conservation and the importance of planting trees in fighting global warming and climate change.

In continuing these efforts, we understand that our commitment to green transformation must also ensure smart transformation. With the region's water-deficient climate, we cannot afford to grow just any type of flora. To achieve sustainability, we must carefully select the plant species that are either native to Qatar's natural habitat or are suitable and adaptive without straining our limited water reserves. Public Parks Department has invested years of research and experiments to reach a level of documentation that serves as a legacy for generations to follow. In this context, The *Encyclopedia of Native & Non-Native Plants in Eastern Arabia* has emerged as an asset for professionals working in relevant fields.

We congratulate the Gulf Organisation for Research & Development (GORD) for taking the lead and successfully developing this pioneering work the benefits of which transcend a range of sectors. The book can be used as a valuable reference tool not just by the agriculturists but also the engineers creating landscaping designs for a range of construction and infrastructure projects, by guiding the right selection of flora from the very start.

We sincerely hope that this book of knowledge benefits all concerned parties and inspires many to take steps in the right direction towards environmental conservation.

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Ziziphus spina-christi

GUIDE TO USE THE ENCYCLOPEDIA

Structure of the Encyclopedia:

This Encyclopedia is divided into six main chapters. Each chapter covers a plant type, classified based on the plants' growing habits (growth form). These chapters are: Trees, Shrubs, Groundcovers, Climbers, Grasses, and Succulents & Desert Plants. A short introduction to each chapter is followed by the included plants arranged alphabetically. Every plant image is presented along with its main features. The Encyclopedia is published in 6 volumes to make it easier for users. Below is a quick roadmap for the document.

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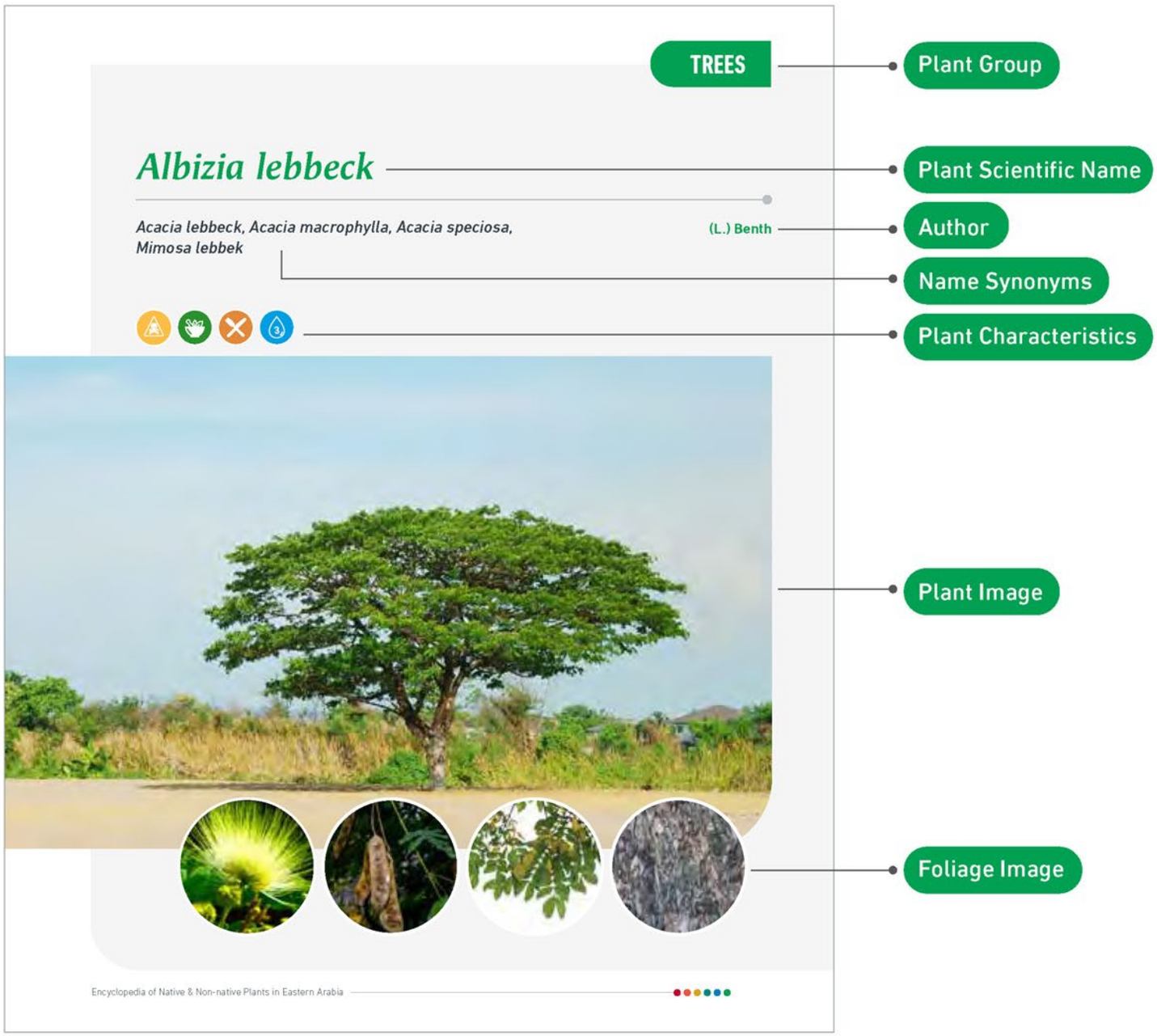
Each plant is followed by specific references to only that plant. At the end of the Encyclopedia, a full list of references, including books, publications and conferences proceedings is presented.

The owner/publisher/author assumes no responsibility or liability for any errors or omissions in the content of this Encyclopedia. The information contained in this Encyclopedia is provided on an 'as is' basis with no guarantees of completeness, accuracy, usefulness, or timeliness considered.

The figure below represents the structure of each plant and the illustrated key symbols:



Plant Characteristics Legend

- Toxic
- Medicinal
- Edible
- Very Low Water Needs
- Low Water Needs
- Moderate Water Needs
- High Water Needs

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TREES

A tree is a perennial plant with an extended stem or trunk that supports photosynthetic leaves or branches above the ground at a certain height. It has a secondary growth-formed woody trunk. It can reach a height of 3 m or more. Trees are either evergreen or deciduous, with foliage that endures and remains green throughout the year, or deciduous, with leaves that fall off at the end of the growing season and then go dormant. Trees have a long lifespan, with some reaching a thousand years of age. According to a 2015 estimate, there are 3.04 trillion trees on the planet, with 1.39 trillion (46%) in the tropics or subtropics, 0.61 trillion (20%) in the temperate zones, and 0.74 trillion (24%) in the coniferous boreal forests. According to the estimate, over 15 billion trees are taken down each year and approximately 5 billion are planted. Since the beginning of human agriculture 12,000 years ago, the number of trees on the planet has decreased by 46%.

Acacia auriculiformis

Racosperma auriculiforme, Acacia moniliformis, Acacia auriculaeformis

A. Cunn ex Benth.

Acacia auriculiformis

Family Name:	Fabaceae
Common Name:	Ear-leaf Acacia, Japanese Acacia, Darwin Black Wattle, Ear Pod Wattle
Growth Form:	Tree
Flowering Period:	Spring – Summer
Conservation Status:	Least Concern
Distribution:	Australia (Western Australia, Victoria, South Australia, New South Wales, Australian Capital Territory), Bangladesh, China, India, Malaysia, Mauritius, Myanmar, Nepal, Pakistan, Panama, Singapore, Sri Lanka, United Republic of Tanzania, USA (Florida)
Nativity:	Adaptive
Height (m):	20 – 35
Time to Ultimate Height (years):	6 – 8
Spread (m):	5 – 15
Canopy Cover:	Dense
Growth Rate:	Fast
Lifespan (years):	25 – 30
Cultivation:	Japanese Acacia is shade-intolerant, and therefore requires a sunny location. Pollarding is beneficial to the tree, as young trees respond to coppicing better than older trees. The trees, on the other hand, do not sprout in a vigorous or abundant manner. Cutting of lower branches and young plants has been suggested as a way to improve stem shape and reduce the occurrence of several stems. The tree will coppice if it is cut above 50 cm, but not if it is cut below. It can be used in both coastal and interior environments.
Hardiness:	9 – 11
Soil pH:	6.6 – 8 .5
Soil Requirement:	Clay
Annual Rainfall Requirement:	700 – 2,000 mm
Water Requirement:	Low
Salinity Tolerance:	Intense
Drought Tolerance:	High

Acacia auriculiformis

Habitat:	The Japanese Acacia is a riparian plant that grows in irregular populations along drainage channels.
Economic Uses:	The heartwood varies in color from light brown to dark red, and it is distinguished from the yellow sapwood by its color. The wood is tough and has a high density in its core. It has a fine and straight grain, is typically attractively figured, is relatively durable, and has a good polish. It's great for turnery, toys, carom coins, chessmen and other handicrafts. If sufficient girth trees are available, it is also utilized for furniture, joinery, tool handles and building. Paper pulp and fuelwood/charcoal are two of the most common uses for the wood. It is utilized as a natural dye in the textile industry in Indonesia. In Australia, the gum is consumed.
Landscape Uses:	The leaf and aromatic blossoms of *A. auriculiformis* can be used aesthetically or as a decorative plant. It creates a great shade tree because of its dense, dark-green foliage that lasts throughout the dry season.
Environmental Uses:	*A. auriculiformis* is utilized to revegetate degraded areas like mine fields. With its spreading, shallow and highly matted root system, these were planted to control erosion. It can also fix nitrogen from the atmosphere due to a symbiotic connection with specific soil microbes. It is beneficial to pollinators of insects. It can withstand pollutants in metropolitan areas.
Medicinal Uses:	The roots are decocted and used to cure aches, pains and sore eyes. Rheumatism can be cured with an infusion of the bark. The bark of all Acacia species is astringent and contains varying amounts of tannins. Astringents are commonly used in the treatment of diarrhea and dysentery, and they can also aid with internal bleeding. Externally, it is used to heal wounds and other skin disorders, as well as hemorrhoids, perspiring feet, some eye ailments and as a mouthwash. Antioxidant, CNS depressive, antibacterial, antimalarial, anti-filarial, cestocidal, antimutagenic, chemopreventive, spermicidal, wound healing, hepatoprotective and antidiabetic activities are only a few of the pharmacological properties of the plant. Additionally, numerous phytochemical analyses indicate the presence of flavonoidal and triterpenoidal saponin glycosides in various portions of this plant.
Remarks:	Avoid placing it near swimming pools and other high-maintenance areas due to the litter it produces through its fruit, twigs and foliage.