

Sidr Trees Between Windbreaks and Production

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Abstract

The Sidr tree (*Ziziphus spina-christi* L.) constitutes a vital economic and environmental resource. From an economic perspective, it offers substantial contributions through its highly marketable, nutritious fruits, consumed fresh, and through its blossoms, which yields from premium grade Sidr honey of of nutritional high Furthermore, its leaves esteemed for their medicinal properties, are utilized in pharmaceutical and cosmetic formulations, whereas its durable wood is valued for trade and fuel.

Ecologically, the Sidr tree plays a pivotal role in combating desertification and preserving ecological balance in its native regions. Its characteristics making it ideal species for enhancing fertility of the soil and preventing erosion. These multifunctional benefits underscore the necessity for its conservation and the development of its cultivation, establishing them fundamental component in environmental initiatives aimed at desertification control and the promotion of ecological balance.

Keywords: *Sidr Trees, Desertification Control, Environmental Sustainability.*

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Habitat and Morphological Description

Sidr trees are members of the genus *Ziziphus*, which includes more than 100 species, and the buckthorn family (*Rhamnaceae*). They are grown in temperate, tropical, and subtropical climates (Tayeb, 2009). Southern Europe, the Himalayas, Northern China, Sudan, the Arabian Peninsula, Iraq, the United Arab Emirates, and possibly North Africa (the Mediterranean basin) are thought to be the tree's native regions (Hiridi, 2009; Asgarpanah and Haghighat, 2012).

Sidr trees have lateral horizontal roots that reach up to 10 meters to absorb surface moisture and deep taproots that reach 3 to 5 meters to groundwater (El-Keblawy et al., 2016). Depending on the species and habitat, the

trunk's height can range from 3 to 10 meters, and its rough, cracked bark is gray to dark brown in color. Its branches are thorny, pendulous, and intricately entwined; they frequently have pairs of sharp, hooked, or straight spines (Al-Abid et al., 2013).

Simple, elliptical or oval in shape (2–7 cm long), alternating on branches, the leaves have finely serrated margins and an asymmetrical base (wider on one side). They have a smooth, glossy, dark green upper surface, a white pubescent underside, and three noticeable basal veins (*triplinerved*) (Azam-Ali et al., 2006).

The tiny (4–5 mm), greenish-yellow, hermaphrodite flowers are grouped in xillarycymes. They are composed of five sepals on the calyx, five petals on the corolla



(sometimes absent), and five stamens on the androecium. Gynoecium: A two-located superior ovary. Insects and bees self-pollinate or cross-pollinate (Liu et al., 2020).

The fruit has a smooth skin that changes from green to yellow or reddish-brown, and it is a drupe that is spherical to oval (1–3 cm in diameter). The pulp is sweet (high in sugars and vitamin C), sticky, and white or light brown. There is a hard, grooved seed inside the stone (Pareek, 2001; FAO, 2019).

Because of their remarkable resistance to drought, salinity, and harsh conditions, sidr trees have a long history in the Arab world and around the world. They are also a valuable economic resource in arid and semi-arid regions (Mohammed, 2011). Edible fruits high in vitamin C, sugars, proteins, amino acids, organic acids, fats, and minerals are produced by these multipurpose trees. Additionally, they provide windbreaks, fuelwood, and medicinal compounds derived from their bark and leaves. Sidr trees also improve soil quality, help prevent desertification, support biodiversity conservation, and show exceptional climate change adaptation. They exhibit innate resistance to pests and diseases, but they do need frequent irrigation after establishment. In Iraq, encouraging Sidr cultivation offers a bright future for sustainable growth. It does, however, necessitate careful planning, in-depth research, and careful evaluation of all environmental and economic aspects that affect project success.

Major Species and Varieties

The types and varieties of Sidr (Christ's Thorn Jujube) differ depending on whether they are grown for their fruits, timber, or medicinal properties. The African Sidr (**Ziziphus abyssinica**) is one of the most significant drought-tolerant species. It comes from sub-Saharan Africa, and its tiny fruits are eaten either fresh or dried.

The Common Sidr (**Ziziphus spina-christi**) is another kind. It produces tiny, sweet-tasting fruits and thorny trees with small, oval leaves. Its fruits are used in traditional medicine, and its wood is used as fuel (Al-Yahyai, R. 2019).

Originally from the Indian subcontinent, the Indian Sidr (*Ziziphus mauritiana*) has successfully adapted to tropical and subtropical climates. Its tree usually grows to a medium height, has glossy oval leaves, and produces small to medium-sized fruits that turn from green to golden yellow or light brown as they ripen. These fruits are useful for making jams, jellies, and refreshing juices in addition to being edible. The leaves, pulp, and decoctions are commonly used in folk medicine to treat inflammatory throat conditions and digestive disorders.

The medium-sized tree known as the Chinese Sidr, or *Ziziphus jujuba*, is found in orchards and small farms throughout much of the world's temperate to warm growth ranges. Its sweet, refreshing flesh is used in desserts, compotes, and revitalizing herbal desserts. Its ripening drupe, also known as jujube, can be glossy red or softer brown. The fruit is a huge health ward due to its remarkably high vitamin C levels. According to Al-Qurashi (2017), jujube is commonly cited in traditional Chinese herbal practice for its calming, nourishing properties.

Prominent Sidr varieties in Iraq include the syrupy Zaytouni (similar to olive in size and texture), the spiny, Turkish import Turki, and the notably prickly Bari or Shouki of wild origin. Nevertheless, the Tuffahi Var., which resembles an undersized apple and has large, symmetrical, sweet flesh, is the arboreal, economic, and everyday crown of the region and dominates both agriculture and city markets. Al-Tae's (2006) observations clearly register the iconic spherical or semi-spherical outline of Tuffahi fruit, exposing its prosperity-booster stature in the gorging silhouette of lower Basra.

The Economic Importance of Sidr Trees (Nabq or *Ziziphus*)

Sidr (Nabq) trees are prized for their many uses in traditional medicine and local cooking in addition to their sweet, nutrient-dense fruits. Agronomic and climatic factors influence their yearly fruit production. The species is representative of the most extreme deserts because it does not fear extreme heat (up to 45°C) and somehow uses water scarcity to its

advantage. A tree usually reaches a profitable bearing three to five years after planting and reaches a plateau after two crops. By adjusting tree density and encouraging mechanical aids, compact planting in specially designed rows promises 5–10 metric tons per hectare, whereas individual tree harvests in open stands convert to 20–100 kg (Al-Yahyai, 2019). Trials and grower surveys also highlight the importance of using vermicompost to increase the fine soil water capacity, infusing humid ground prior to harvest, and using seasonal pruning to remove shaded interior leaves. To increase fruit size and concentrate regional micro-markets, supplemental micro-spray is only added when groundwater reserves fall below drought margins.

The Nutritional Value of Nabq (Sidr fruit)

Because of its high nutritional value, jujube (*Ziziphus jujuba*) fruit has been used for thousands of years as a meal, flavoring, and additive. Due to its primary biologically active components—phenolics, triterpenic acids, flavonoids, α -tocopherol, β -carotene, cerebrosides, and polysaccharides—*Ziziphus jujuba* has been shown to have anticancer, anti-inflammatory, antiobesity, antioxidant, immune-stimulating, neuroprotective, and hepato- and gastro-protective qualities (Azami Movahed et al., 2024).

In addition, Jujube contains potassium, phosphorus, manganese, and calcium as the major minerals. There are also high amounts of sodium, zinc, iron and copper. Jujube also contains vitamin C, riboflavin, and thiamine. The vitamin and mineral content of the fruit helps to support cardiovascular health and enhance metabolism (Pareek, 2013).

Furthermore, a restoration of normal histology was found in the tissues and organs examined histologically. This could be because in male rat models of hypercholesterolemia, the antioxidant qualities of Christ's thorns leaves reduced lipid peroxide, alleviated hyperlipidemia, and enhanced liver and kidney functions. The anti-hyperlipidemic effects of Christ's thorn may be due to its phenol

component, which prevents oxidative stress (A Elanany & Salem, 2024).

The Economic Importance of Sidr Trees (Nabq or Ziziphus)

The Sidr tree (**Ziziphus spina-christi**) is a fruit-bearing tree of significant economic, environmental, and medicinal value, particularly in arid and semi-arid regions. It exhibits longevity, often exceeding 50 years, and maintains prolonged fruit-bearing periods. Among its economic benefits, Sidr honey (Samr honey) stands out as the most prominent.

Sidr Honey or Samr Honey

One of the best types of natural honey is Sidr honey, also known as Samr honey. It comes from the nectar of wild Sidr trees, also known as jujube or Christ's thorn. Iraqi Sidr honey is renowned for its outstanding quality, making it a valuable export good with substantial financial returns, particularly from northern regions such as Kurdistan and the western and southern areas. Its distinct chemical makeup and medicinal qualities account for this distinction. According to research, Sidr honey is a complete bioactive complex rather than just a natural sweetener. Rare enzymes, phenolic compounds, free amino acids (which provide the body with 22 essential amino acids), and strong antioxidants like flavonoids are all present in it (Alqarni et al., 2014). These components offer a variety of health advantages.

Additionally, Sidr honey is a good nutritional supplement for increasing immunity and improving metabolism because it is high in vitamins and minerals (such as iron, zinc, and potassium) (FAO, 2020). Its effectiveness as a natural antibiotic against pathogens resistant to traditional antibiotics has been demonstrated in medicine. It also acts as a natural energy source and shows better results in wound and burn healing than some pharmaceutical preparations (Rhodes & Molan, 2015; Khalil et al., 2011).

Several crucial factors make honey production economically significant. Particularly in regions where Sidr trees are common, honey production provides thousands of rural families with a primary or secondary source of income. In fields like beekeeping, honey collection, packaging,

marketing, and transportation, it offers good job opportunities.

Healthy wild Sidr trees are necessary for the production of Sidr honey, which promotes the preservation of these important trees for the environment (they stabilize soil, offer shade, and serve as wildlife habitats). Bees also help pollinate Sidr blossoms and nearby wild plants, which indirectly maintain plant diversity and boost agricultural output.

Sidr Leaves

Sidr leaves (*Ziziphus spina-christi*), along with their young branches, serve as valuable nutritional fodder for livestock, particularly during drought conditions when conventional forage becomes scarce. These leaves' unique phytochemical profile and numerous health advantages have garnered significant scientific interest in addition to their agricultural value.

Approximately 431 chemical compounds have been discovered from phytochemical studies on plants in the genus *Ziziphus*. The two main classes are flavonoids and cyclopeptide alkaloids. Numerous pharmacological activities, including antibacterial, anticancer, antidiabetic, antidiarrheal, anti-inflammatory, antipyretic, antioxidant, and hepatoprotective properties, are demonstrated by the crude extracts and isolated compounds, both in vitro and in vivo. According to toxicology research, *Ziziphus* species appear to be safe at recommended therapeutic dosages (El Maaiden et al., 2020).

According to recent studies, this plant may improve antidiabetic results by increasing insulin sensitivity and regulating blood sugar levels (Abdel-Zaher et al., 2005; Omid et al., 2020). In addition to their hepatoprotective and renoprotective properties against hepatotrophic and nephrotoxic agents (Al-Qarawi et al., 2004; Bad et al., 2013), preparations made from the leaves protect tissues from oxidative stress and may therefore reduce the risk of cardiovascular disorders and certain neoplasms (Michel et al., 2011; Abdallah et al., 2019).

According to Sakr et al. (2012), antiproliferative effects verified by in vitro assays exhibit specific activity against specific malignant cell lines. Clinical and experimental use also includes

dermal care, where it has been shown to be effective in treating inflammatory and infectious dermatoses, such as burns, eczema, and acne vulgaris, as well as traumatic lesions (Mohammed et al., 2021).

Leaf decoctions are used in traditional hair care formulations to promote hair retention and scalp health (Abdel-Wahhab, 2007). Leaf extracts' anti-aging properties are used in cosmetic formulations (Abdallah & Al-Ghamdi, 2019). One use in agriculture is the stabilization of organic matter as a soil amendment (El-Keblawy & Al-Rawai, 2007). Consequently, the *Ziziphus spina-christi* plant is regarded as a valuable tree for the future creation of numerous medications due to its active ingredients and ease of growing (Hussein, 2019).

Sidr Tree Wood

In addition to producing nutrient-dense fruit, the Sidr tree is also valuable for its wood. Sidr wood, which is dense and finely grained, is known for its resistance to wear and splitting, allowing it to season into poles that can endure the harsh conditions of moisture and heat. Farmers form its robust lengths into handles for axes and hoes, fusing craft and utility, while artisans prefer it for traditional furniture that blends beauty and durability. This same tenacity preserves heritage in each finely chiseled detail of the delicate carvings that adorn homes and prayer niches (Al-Khalifa, 2010). It is also used as firewood for cooking and heating and yields high-quality charcoal with a calorific value of up to 5,000 kcal/kg (FAO, 2018).

The significance of Sidr trees for the environment (as windbreaks).

In an era of rising temperatures, the sidr groves act as living walls of green, with their dense foliage acting as a windbreak and aiding in the land's natural cooling. Their robust, low-branched, dense leaves provide shade that protects the soil from the sun's glare and the roots of the seedlings from drought, forming an endless cycle that keeps the ground alive even as the temperature rises.

They are characterized by a dense canopy and small, closely spaced leaves, allowing them to dissipate wind force gradually rather than

abruptly stopping it, which reduces air vortices behind the windbreak. Their planting is in parallel rows with the prevailing wind direction (usually perpendicular to it). That is, using two or more rows is preferred, with spacing of 3–4 meters between trees and 5–7 meters between rows. Sidr trees are considered a complete ecosystem that provides sustainable protection for the soil, as they tolerate drought and high temperatures up to 50°C, and salinity reaching >8000 parts per million (Noulèkoun et al., 2021). That is, they can adapt to climate change and stabilize soil due to their deep roots reaching 20 m (Journal of Environmental Sciences, 2020).

Additionally, they are perfect for afforestation projects and fighting desertification because of their dense leaves and branches, low water requirements, and high tolerance to harsh environmental conditions (El-Keblawy and Al-Rawai, 2007).

Among the suggested recommendations is encouraging organized agriculture, such as establishing specialized Sidr orchards for fruit and honey production, as well as integrating them into afforestation and desertification control projects to leverage their combined environmental and economic benefits." This makes them an intelligent investment in terms of both the economy and the environment, especially in our nation of Iraq.

Conclusions

The Christ's Thorn tree represents an integrated economic system that creates jobs and contributes to the green economy. These trees are essential for maintaining environmental balance, making them crucial for eco-sustainability projects.

Suggestions

It is recommended to develop future plans and strategies to preserve existing trees and expand their cultivation, whereas averaging scientific research to enhance their productivity and product quality. Additionally, also integrate them into afforestation and desertification control projects, would maximize their environmental and economic advantages.

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