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Khejri (*Prosopis cineraria*): The Lifeline of the Desert Ecosystem

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Introduction

The Thar Desert, also known as the Great Indian Desert, is one of the largest arid regions in the world, covering approximately 200,000 square kilometers. It stretches across northwestern India, primarily in Rajasthan, Gujarat, Punjab, and Haryana. The Thar Desert experiences harsh climatic conditions, marked by extreme temperatures, sparse vegetation, and minimal rainfall, averaging between 100 to 500 millimetres annually, making it a quintessential desert. A limited number of highly erratic rainy days define the region's arid zones. Other notable features include a high evaporation rate of around 6 mm per day, significant temperature fluctuations ranging from as low as -2.5°C in winter to nearly 49.9°C in summer, and strong wind speeds of 30 km per hour (Meena *et al*., 2023). The Thar Desert's plant life, consisting of drought-tolerant shrubs and trees with deep roots, is well-adapted to survive its harsh conditions. Common vegetation in the region includes Ber (*Ziziphus mauritiana)*, various Acacia species, cacti, the Khejri tree (*Prosopis cineraria)*, and several types of grasses, all of which thrive in the arid environment. In India, it is also known by many other names such as Shami (Sanskrit), Jand (Punjab), Sumri (Gujarat), Banni (Karnataka), Janti (Haryana), and Jammi in Telangana and Andhra Pradesh (Samadiya, 2015). In Rajasthan, it is called Khejri or Khejro. Khejri holds significant economic value in the Indian Desert, thriving despite the region's harsh climatic conditions. It is unique as the only leguminous tree that prospers in such an extreme environment. Remarkably, during the peak of the dry season, from March to June, when most other desert trees remain leafless and inactive, the Khejri continues to produce new leaves, flowers, and fruits. The Khejri tree typically grows to a height of 10 to 12 meters, making it one of the tallest trees in desert landscapes. Upon maturity, its crown expands to a

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width of 10 to 12 meters, providing substantial shade and relief from the intense heat. As the tree ages, its trunk thickens, reaching a diameter of 0.5 to 1 meter, which helps the tree conserve water and withstand prolonged drought conditions. Due to these unique traits, the Khejri tree plays a vital role in supporting the desert ecosystem. The Bishnoi community holds the Khejri tree in deep reverence, referring to it as "Amrita Devi." In a historic act of defiance, Amrita Devi, along with 363 others, sacrificed their lives by embracing the trees to protect them from being cut down, following Maharaja Abhay Singh's orders to use the wood for building his palace. Their ultimate sacrifice highlights the community's unwavering commitment to conserving the Khejri tree (Mangilal, 2020).

Ecological importance

Khejri-based agroforestry systems are very productive, diverse, and efficient. The ecosystem services provided by Khejri-based agroforestry systems emphasize multiple services of food, fodder, and firewood; regulatory and supporting services including the control of erosion, carbon sequestration, improvement in microclimate, arrest of desertification, soil fertility improvement, and biodiversity conservation. The Khejri tree, a nitrogen-fixing legume, features a phreatophyte root system that taps into water from deep soil layers, ensuring moisture availability to crops and grasses in the upper soil without competing for resources. Its presence promotes vegetative growth and enhances soil fertility. In agroforestry systems, nutrient cycling occurs through three main processes: 1) increased nitrogen supply through biological nitrogen fixation, 2) enhanced nutrient availability via biomass decomposition, and 3) deeper soil nutrient uptake by the tree, which benefits surrounding crops (Keerthik and Shukla, 2015). The tree provides shade and habitat for a variety of wildlife, including birds, insects, and small mammals, supporting local biodiversity. Additionally, it acts as a decisive source of fodder for livestock during dry seasons, sustaining the livelihoods of many rural communities.

Traditional and cultural significance

Traditional and cultural significance of the Khejri tree is deeply rooted in the customs and beliefs of the communities in the Thar Desert region. In the Valmiki Ramayana, the Khejri tree is mentioned as one of the trees found on the hills of Panchvati. Lakshman used its branches to construct the support beams for their thatched hut, the Parnakuti, where he lived with Lord Rama and Sita during their 14-year exile. The Khejri tree holds a revered cultural status in society. During Janmashtami, the celebration of Lord Krishna's birth, green twigs from the

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Khejri tree are worshipped in households. In certain districts of Rajasthan, the tree is considered a symbol of Lord Krishna. The worship of the Khejri tree, known as 'sampuja,' has ancient roots. The Pandavas is said to have worshipped this tree and concealed their weapons in it during their period of Agyatavasa (exile in disguise). Since Vedic times, the wood of the Khejri tree has been used to ignite the sacred flames of yagyas, important rituals of devotion and purification through fire (Bishnoi, 2024). In local communities, the Khejri tree holds significant cultural importance, particularly in marriage ceremonies. Its branches and leaves are often used as part of traditional rituals.

Medicinal and Nutritional Value

Desert people have traditionally used various sections of khejri plants for medicine and nutritional purposes.

- **Medicinal Value:** The Khejri tree has several medicinal properties and is used in traditional Indian medicine for the treatment of various ailments. The bark (locally known as choda) of the tree is used to treat diarrhea and dysentery, while the gum is used to treat wounds and skin disorders. Extract from unripe fruit pods of the plant was shown to ameliorate artificially-induced damage to testes in an animal model (Vellapandian *et al*., 2020). Leaves of this tree can ameliorate mouth ulcers. Chewing its leaves for a few minutes, so releasing the juice of the leaves in the mouth can relieve the ulcers.
- **Nutritional Benefits:** highly nutritious leaves constitute an important source of fodder for livestock while nutritious pods are valued as vegetables for human beings. The immature pods are rich in crude protein, carbohydrates, and minerals. About 18 percent crude protein, 56 percent carbohydrates, 0.4 percent each of phosphorus and calcium, and 0.02 percent iron in immature pods. The immature pods are used as vegetables both fresh as well as after dehydration, while ripe dried pods having 9-14 percent crude protein and 6-16 percent can be powdered and used in the preparation of bakery items such as biscuits and cookies (Meena *et.al*., 2023). Prosopis cineraria fruit is very rich in vitamin C and calcium and phosphorus contents.

Table1. Nutrient content of pods of Prosopis cineraria

Sr.No	Name of nutrient	Quantity
1	Protein	23.2%

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2	Carbohydrate	56.0%
3	Fat	2.0%
4	Fibre	20%
5	Vitamin 'C'	523.0 (mg/100g)
6	Calcium	414 (mg/100g)
7	Ferrous	19.0 (mg/100g)
8	Energy	334.8 (Kcal/gm)

Economic Benefits

- **Fuel:** The wood of the Khejri tree is an excellent source of fuel and is used for cooking and heating. The branches, twigs, and other parts of the tree, after being pruned, are used as firewood.
- **Timber:** The wood of the Khejri tree is hard, durable, and termite-resistant. It is used for making furniture, agricultural implements, and construction materials.
- **Fodder:** The Khejri tree provides a valuable source of fodder for livestock, particularly during the dry season when other vegetation is scarce. The leaves, pods, and bark of the tree are all used as fodder. The dry leaves are called "loong" and are used as fodder for domestic animals like goats, sheep, and camel and wild animals like blackbucks, nilgais, chinkara, and more. During winter, villagers prune their trees and leave the foliage to dry under the sun. Initially, the moisture content in the fresh leaves can be as high as 60%. As the moisture gradually evaporates, the leaves become brittle and fall to the ground. These dried leaves are then carefully stored in suitable fodder chambers and used for stall feeding livestock whenever needed (Mann and Shukla, 1980). These dried leaves serve as a highly nutritious feed, providing essential nutrients to livestock, particularly during dry seasons when other fodder is scarce. The leaf fodder is also sold at a high price of 10-15 Rs/kg and has excellent market opportunities.
- **Pods:** From a mature tree, 25-30 kg loong and 10-15kg tender pods can be harvested annually (Samadiya, 2015). The sangri is sold at a high cost both fresh and dehydrated (50-80 and 800-1000 Rs/kg, respectively), and is an eye-catching vegetable. Numerous proverbs in the Thar Desert region are related to the pods of the Khejri tree. These

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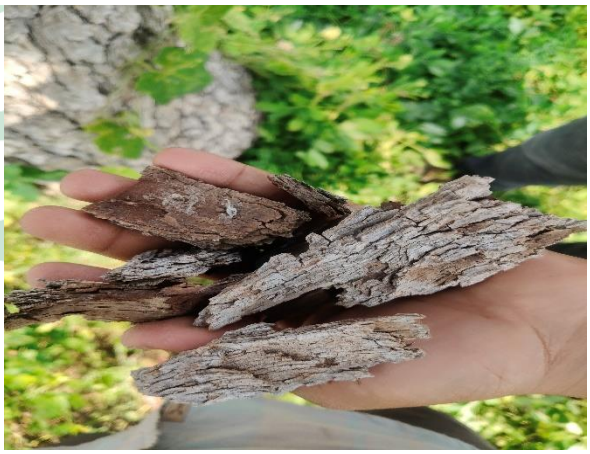
sayings reflect the deep cultural and practical significance of the tree and its pods in the daily lives of the local people.

1. "Sangar, Phog, Thali ko- Mewo": Pod of the Khejri and flowers of the phog (*Calligonus Polygonoides Linn.*) are considered to be dry fruits in the extreme arid areas (locally known as Thali) of western Rajasthan.
2. "Sangar ghanhu, Kair til, Aak gana capas, phogas photila Bhadli, Bandho Samay-ki Aas": when growth of the pods is better than wheat crop production will better, if Kair is good than til (Sesamum) will good, if Aak (*Calotyopis procera (Ait) R.Br.)* is better than possibilities' of Capas (cotton) is more. If Phog, (*Calligdnum Eolvgonoides Linn.)* blooms then there is a possibility of a good time.

Khejri Tree

Animals Seeking Shade Under Khejri Tree

Leaves of Khejri Tree



Bark of Khejri Tree

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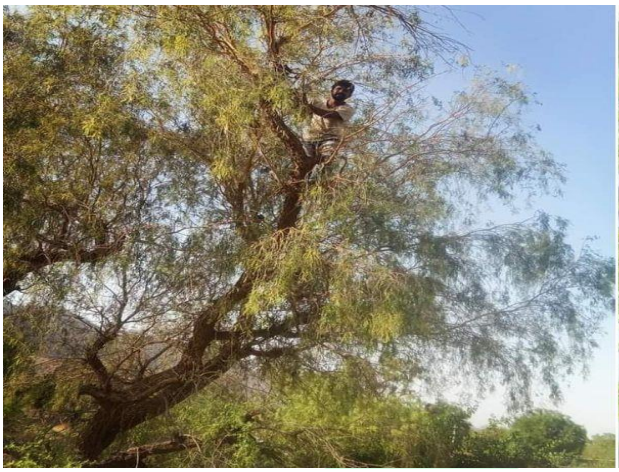

Full bearing of tender pods

Tender pods for dehydration

Importance to society

The Khejri tree holds immense importance to society, offering ecological, economic, and cultural benefits that support the livelihoods of desert communities. Some communities in the arid zone abhor the cutting of the trees. This tree is held sacred by "Bishnoies" an agricultural community of the region. For the distribution of it, one of the proverbs proves that “Gaon Gaon Gogo ne Gaon Gaon Khejri”. It means every village has a shrine of Goga, (snake God) under the Khejri, being a shady tree (Mann and Saxena, 1980). In the extreme desertic area in summer, the travellers sit under this tree for taking rest While going on foot from one village to another. Water huts are used to make under shades for travellers and passersby. The camp of barat (marriage party) stays under its shade. Almost all animals stay under its shade in summer and get protection.

Challenges

Despite being one of the most prominent trees in the desert and offering immense value to the local communities through food, fodder, wood, and medicinal uses, the Khejri tree is now struggling for survival. Over the past few decades, the ecological conditions in the Thar Desert have shifted, leading to a steady decline in the population of this vital tree. Its once-thriving presence is now diminishing, highlighting the urgent need for conservation efforts. With the government's increased emphasis on solar energy, Rajasthan has emerged as a key state for solar power development, attracting numerous companies looking to harness its abundant sunlight. These companies often lease large tracts of land to install solar panels. However, in the process, thousands of Khejri trees, which are crucial to the desert ecosystem,

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are being cut down to make room for solar infrastructure. Despite the environmental importance of the Khejri tree, deforestation continues, posing a significant threat to biodiversity and the sustainability of Rajasthan's fragile desert landscape. According to the report, the Khejri tree population is declining at an alarming rate due to various factors. These include the ongoing depletion of groundwater, climate change, increased attacks by pests such as termites, the spread of fungal diseases, and the unchecked cutting of trees driven by urbanization. Further, the preface of numerous threatened Khejri tree species in the desert climate has getting replaced by fast-growing tree species namely neem (*Azadirachta indica*), Gulmohar (*Delonix regia*), Karanja (*Pongamia pinnata*), Sheesham (*Dalbergia sissoo*), and peepal (*Ficus religiosa*) in the desert ecosystem (Ranawat *et.al*., 2022).

Conservation Efforts

Under the Rajasthan Tenancy Act of 1955, the penalty for cutting down Khejri trees is a mere ₹100, a fine that is outdated and insufficient given the current environmental challenges. This penalty should be revised and adjusted to reflect today's ecological priorities. Rather than cutting down Khejri trees, companies involved in green and solar projects should be encouraged to adopt tree translocation techniques to preserve them. Additionally, a robust afforestation policy should be implemented, promoting the planting of new trees as a sustainable alternative to deforestation. To ensure the conservation of the Khejri tree, raising public awareness is essential. People need to be educated about the tree's numerous benefits, including its ecological significance and its role in supporting livelihoods in desert regions. The Khejri tree not only enhances soil fertility and provides shade but also serves as a valuable source of fodder, fuel, and timber for local communities. By highlighting these important features and their contribution to sustainable living, we can foster a sense of responsibility towards preserving this vital species for future generations.

Conclusion

The Khejri tree is a cornerstone of the Thar Desert ecosystem and local livelihoods, offering numerous ecological, economic, and cultural benefits. It sustains rural communities through its provision of fodder, wood, and medicine, while also improving soil fertility and combating desertification. Despite its significance, the tree faces severe threats from declining groundwater levels, pest attacks, and increasing deforestation due to urbanization and solar energy projects. The outdated penalty for its cutting, under the Rajasthan Tenancy Act, needs

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urgent revision. Conservation efforts must focus on promoting tree translocation, enforcing stricter penalties, and fostering public awareness of the Khejri's crucial role in environmental sustainability. A comprehensive afforestation policy should be developed to protect this vital species, ensuring that it continues to thrive in the desert for generations to come. The future of Rajasthan's ecosystem depends on the preservation of the Khejri tree.

References

Bishnoi, S. (2024). Khejri: A Wonder Tree of the Thar. In Sahapedia. Retrieved from: https://www.sahapedia.org/khejri-wonder-tree-of-the-thar#.

Keerthik, A., and Shukla, M. (2015). Khejri Agroforestry for Addressing Issues of Soil Health. *Life Sciences Leaflets*, 64, 102-108.

Mangilal., (2023). Bishnoi Movement of Khejarli: A Socio-Cultural Analysis. *International Journal of Advance Research*, (06), 381-383.

Meena, M. L., Kumari, N., and Kundu, M. S. (2023). Khejri: A wonder tree for nutritional value. *Indian Horticulture*, 68(3), 32-35.

Ranawat, J. S., Deswal, R. P. S., Kaushik, N. (2022). Khejri (Prosopis cineraria L. Druce): The lifeline of the Desert. *Just Agriculture*, 2(5),

Samadia, D. K. (2015). Khejri–Thar Shobha: Grow for horticultural exploitation. Technical Folder, ICAR-CIAH: Bikaner, 6p.

Vellapandian, C., Vetrivelan, V. R., and Sukumaran, E. S. (2020). Un-riped fruit pods of Prosopis cineraria (L.) Druce ameliorates Cisplatin therapy-induced partial testicular atrophy in male Wistar rats. Journal of Ethnopharmacology, 261, 113070.