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Khejri *(Prosopis cineraria):* An Economic, Environmental and Health Resource for Sustainable Development in Rajasthan

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Abstract

Rajasthan, India's largest state by geographical area, is characterized by arid and semi-arid climatic conditions, limited water resources, and fragile ecosystems. In such an environment, Khejri (Prosopis cineraria) has emerged as a keystone species supporting ecological balance, rural livelihoods, and food security. Popularly known as the "Kalpavriksha of the Desert," Khejri provides multiple economic, environmental, nutritional, and medicinal benefits. The tree forms the backbone of traditional agroforestry systems in western Rajasthan and contributes significantly to income generation through fodder, fuelwood, timber, and the highly valued Sangri pods. Furthermore, Khejri enhances soil fertility, conserves biodiversity, and mitigates climate change, and supports human and livestock health. This paper examines the economic significance, environmental contributions, and health benefits of Khejri and highlights its role in promoting sustainable development in Rajasthan.

Keywords: Khejri, Prosopis cineraria, Rajasthan, Agroforestry, Sustainable Development, Agricultural Economics, Environmental Conservation, Health Benefits

1. Introduction

Rajasthan, the largest state in India by geographical area, occupies approximately 10.4 percent of the country's total land area and encompasses a major portion of the Thar Desert. The state is characterized by arid and semi-arid climatic conditions, low and erratic rainfall, recurrent droughts, high temperatures, and fragile ecosystems. These environmental constraints pose significant challenges to agricultural productivity, food security, and the livelihoods of rural communities. Since agriculture and livestock rearing form the backbone

of the state's economy, sustainable management of natural resources is essential for ensuring long-term economic and environmental stability.

In this challenging environment, Khejri (Prosopis cineraria) has emerged as one of the most valuable and resilient tree species of the desert ecosystem. Popularly known as the "Kalpavriksha of the Desert," Khejri has been an integral part of Rajasthan's culture, economy, and ecology for centuries. The tree is highly drought tolerant and can survive under extreme climatic conditions, including temperatures exceeding 45°C and annual rainfall below 200 mm. Its deep root system enables efficient utilization of underground moisture, allowing it to remain productive even during prolonged dry periods.

Khejri is recognized as the State Tree of Rajasthan due to its immense contribution to rural livelihoods and environmental conservation. The species provides multiple products and services, including fodder, fuelwood, timber, edible pods (Sangri), and traditional medicines. Sangri, a highly valued desert vegetable, contributes to household nutrition and generates substantial income for farming families. The nutritious leaves, locally known as Loong, serve as an important source of fodder for livestock, particularly during drought years when other feed resources become scarce.

From an agricultural economics perspective, Khejri plays a crucial role in enhancing farm resilience and income diversification. The tree is a key component of traditional agroforestry systems in Rajasthan, where it is grown in association with crops such as pearl millet, cluster bean, mung bean, and moth bean. Through nitrogen fixation, organic matter addition, and improvement of soil fertility, Khejri enhances crop productivity while reducing production risks associated with climatic uncertainties. These benefits contribute significantly to the sustainability and profitability of farming systems in arid regions.

Beyond its economic importance, Khejri provides vital ecosystem services. It helps control soil erosion, prevents desertification, improves soil health, sequesters carbon, and supports biodiversity conservation. Furthermore, various parts of the tree possess medicinal properties and have been traditionally used for the treatment of several human ailments. Thus, Khejri contributes not only to environmental sustainability but also to human and livestock health.

Given its multifaceted role in supporting livelihoods, environmental conservation, and public health, Khejri represents a valuable natural resource for sustainable development in Rajasthan. This paper examines the economic, environmental, and health significance of Khejri and highlights its contribution to climate-resilient agriculture and rural prosperity in the state's arid and semi-arid regions.

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3. Economic Importance of Khejri in Rajasthan

3.1 Contribution to Farm Income

Khejri provides multiple marketable products that supplement farm income:

Major Economic Products of Khejri (Prosopis cineraria)

Sangri (Dried Pods):

Sangri is the immature pod of Khejri and is considered a premium desert vegetable in Rajasthan. It is rich in nutrients and commands a high market price, providing an important source of income for rural households.

Loong (Leaf Fodder):

The leaves of Khejri, locally known as Loong, are highly nutritious and palatable for livestock. They serve as a valuable source of green fodder, particularly during drought periods when other fodder resources are scarce.

Fuelwood:

Khejri wood is an excellent source of fuel due to its high calorific value and slow-burning characteristics. Rural communities extensively use it for domestic cooking and heating purposes.

Timber:

The wood of Khejri is strong, durable, and resistant to termite attack. It is commonly used for agricultural implements, furniture, house construction, fencing, and other rural applications.

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Gum and Medicinal Products:

Khejri produces natural gum that has traditional medicinal and industrial uses. Various parts of the tree, including bark, leaves, flowers, and pods, are used in traditional medicine for treating digestive disorders, respiratory ailments, skin diseases, and inflammatory conditions Among these, Sangri is considered a premium desert vegetable and forms an important component of traditional Rajasthani cuisine. Its market price often ranges from ₹300 to ₹1,000 per kilogram depending upon quality and demand.

The commercialization of Sangri production offers significant opportunities for income diversification among farmers in arid districts.

3.2 Fodder Security and Livestock Economy

Livestock plays a central role in Rajasthan's rural economy. During drought periods, Khejri leaves serve as a valuable source of nutritious fodder for cattle, sheep, goats, and camels.

The availability of green fodder during lean seasons reduces feed shortages and supports livestock productivity, thereby contributing to household income and food security.

3.3 Agroforestry-Based Economic Benefits

Khejri-based agroforestry systems represent a sustainable land-use practice that combines agricultural crops with tree cultivation on the same piece of land. In the arid and semi-arid regions of Rajasthan, Khejri is commonly integrated with crops such as pearl millet, cluster bean (guar), mung bean, moth bean, and cumin. This combination enables farmers to obtain both agricultural produce and valuable tree products, thereby maximizing the productivity of available land resources.

The presence of Khejri in cropping systems improves resource-use efficiency by utilizing different soil layers for nutrient and water uptake. Its deep root system minimizes competition with crops while enhancing soil fertility through biological nitrogen fixation and the addition of organic matter from leaf litter. These improvements contribute to better crop

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growth and increased yields. Agroforestry systems based on Khejri also reduce the risks associated with climatic variability, drought, and crop failure by providing multiple sources of income. Consequently, farmers benefit from greater economic stability, improved farm productivity, and enhanced resilience to environmental stressses.

3.4 Employment Generation

Khejri cultivation and the utilization of its products create substantial employment opportunities in rural areas. Various activities associated with the tree, including nursery production, seed collection, plantation establishment, irrigation, pruning, harvesting, processing, packaging, transportation, and marketing of Sangri and other products, require significant labor inputs. These activities generate both seasonal and year-round employment for rural households.

Women play a particularly important role in the collection, processing, and value addition of Sangri products, thereby contributing to household income and economic empowerment. Smallholder farmers, landless laborers, and rural entrepreneurs also benefit from employment opportunities created through Khejri-based enterprises. The expansion of value-added products such as dried Sangri, pickles, and processed food items further enhances income-generating opportunities and supports rural economic development.

4. Environmental Significance

Khejri (*Prosopis cineraria*) is widely recognized for its ecological importance and its ability to improve environmental quality in arid ecosystems. The tree contributes significantly to soil conservation, nutrient cycling, biodiversity enhancement, carbon sequestration, and climate resilience. Its adaptability to harsh environmental conditions makes it an essential component of sustainable land management practices in dryland regions.

4.1 Soil Fertility Enhancement

Khejri is a leguminous tree species with the unique ability to fix atmospheric nitrogen through its symbiotic association with nitrogen-fixing microorganisms. This process enriches the soil with nitrogen, one of the most important nutrients required for plant growth. In addition, the continuous shedding and decomposition of leaves, twigs, and other plant residues contribute organic matter to the soil, improving its overall fertility and productivity.

The accumulation of organic matter enhances soil organic carbon content and promotes nutrient cycling. Improved soil conditions support greater microbial activity, which plays a vital role in nutrient transformation and availability. Furthermore, Khejri improves soil structure by increasing aggregation and porosity, leading to better root growth and

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enhanced water infiltration. The tree also improves the soil's water-holding capacity, which is particularly beneficial in drought-prone regions where moisture availability is limited.

The major benefits of Khejri in improving soil fertility include increased nitrogen availability, enhanced soil structure, greater microbial activity, improved nutrient cycling, and better water retention capacity. These characteristics make Khejri an important natural resource for maintaining soil health and sustaining agricultural productivity in arid and semi-arid ecosystems.

4.2 Climate Change Mitigation

The tree contributes to carbon sequestration through biomass accumulation and soil carbon storage. Khejri-based agroforestry systems help reduce greenhouse gas concentrations while improving climate resilience.

4.3 Control of Desertification

Wind erosion and desertification are major environmental concerns in western Rajasthan. Khejri stabilizes sandy soils through its extensive root network and acts as a natural windbreak.

The species plays a vital role in protecting agricultural lands from shifting sand dunes and maintaining ecological stability.

4.4 Biodiversity Conservation

Khejri supports diverse flora and fauna by providing habitat, shelter, nesting sites, and food resources. It contributes significantly to maintaining biodiversity in desert ecosystems.

5. Health and Nutritional Importance

Nutritional Value of Sangri

Sangri, the immature pods of Khejri (Prosopis cineraria), is one of the most valued traditional food products of Rajasthan and forms an integral part of the state's culinary heritage. The pods are highly nutritious and serve as an important source of food, particularly in arid and semi-arid regions where nutritional resources are often limited. Sangri is rich in protein, carbohydrates, dietary fiber, and essential minerals such as calcium, iron, and phosphorus, making it a valuable component of a balanced diet.

The high protein content of Sangri contributes to body growth, tissue repair, and overall health maintenance, while carbohydrates provide a readily available source of energy. Dietary fiber supports digestive health and helps prevent various gastrointestinal disorders. The presence of essential minerals further enhances its nutritional significance; calcium contributes to bone and teeth development, iron plays a vital role in hemoglobin formation and prevention of anemia, and phosphorus supports energy metabolism and skeletal health.

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Traditionally, Sangri is consumed in various forms, including dried vegetables, pickles, and the famous Rajasthani dish "Panchkuta." Its long shelf life and high nutritional value make it particularly important during drought periods and food scarcity situations. In rural communities, Sangri contributes significantly to household food and nutritional security by providing a locally available and nutrient-rich food source. With growing interest in functional foods and traditional nutritional resources, Sangri has considerable potential for wider commercialization and inclusion in health-oriented food products.

6. Role of Khejri in Sustainable Development

Khejri (*Prosopis cineraria*) plays a vital role in promoting sustainable development in the arid and semi-arid regions of Rajasthan. Due to its multifunctional nature, the tree contributes significantly to economic growth, environmental conservation, and social well-being. Its integration into traditional farming systems enhances the sustainability and resilience of rural livelihoods.

6.1 Economic Sustainability

Khejri provides multiple sources of income to farmers through the production of sangri pods, fodder (loong), fuelwood, and timber. These products diversify farm income and reduce dependence on a single agricultural enterprise. The tree supports livelihood security by generating employment opportunities in harvesting, processing, marketing, and value-added activities related to Khejri products. During drought years, Khejri serves as an important economic safety net for rural households.

6.2 Environmental Sustainability

Khejri contributes significantly to environmental conservation by preventing soil erosion, improving soil fertility through biological nitrogen fixation, and enhancing soil organic matter. Its deep root system helps stabilize sand dunes and conserve moisture in dry regions. The tree also acts as an effective carbon sink by sequestering atmospheric carbon, thereby contributing to climate change mitigation. Furthermore, Khejri supports biodiversity by providing habitat and food resources for various plant and animal species, strengthening ecosystem resilience.

6.3 Social Sustainability

Khejri plays an important role in ensuring food and nutritional security in rural communities. Sangri pods are a valuable source of nutrients and form an integral part of traditional diets in Rajasthan. The tree supports livestock-based livelihoods through the provision of nutritious fodder during periods of feed scarcity. In addition, Khejri is deeply

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embedded in the cultural heritage and traditional knowledge systems of local communities, contributing to the preservation of indigenous practices and rural traditions.

6.4 Contribution to Climate-Smart Agriculture

The integration of Khejri into agricultural landscapes is consistent with the principles of sustainable agriculture and climate-smart farming. Its ability to withstand extreme temperatures, drought, and water scarcity makes it a valuable component of climate-resilient farming systems. By improving resource-use efficiency, enhancing ecosystem services, and supporting rural livelihoods, Khejri contributes to long-term agricultural sustainability in Rajasthan and other dryland regions.

7. Policy Implications

To maximize the benefits of Khejri, the following policy measures are recommended:

1. Promotion of Khejri-based agroforestry systems.
2. Establishment of quality nurseries and planting material supply chains.
3. Development of value-added Sangri processing industries.
4. Strengthening research on nutritional and medicinal properties.
5. Inclusion of Khejri plantations in climate adaptation and carbon-credit programs.
6. Capacity building and training of farmers on scientific management practices.

8. Conclusion

Khejri (Prosopis cineraria) is more than a tree; it is a vital natural asset supporting the economy, environment, and health of Rajasthan. Its contribution to farm income, fodder security, soil fertility, climate resilience, nutritional well-being, and biodiversity conservation makes it indispensable for sustainable development in arid and semi-arid regions. Strengthening Khejri-based agroforestry systems can play a crucial role in achieving long-term agricultural sustainability, environmental protection, and livelihood enhancement in Rajasthan.

References

Samadia, D.K. et al. (2021). Khejri Research for Horticultural Harnessing and Environmental Services. Journal of Agriculture and Ecology.

ICAR-CAZRI, Jodhpur. Annual Reports and Agroforestry Publications.

National Agroforestry Policy, Government of India.

FAO (Food and Agriculture Organization). Agroforestry for Sustainable Dryland Development.

Rajasthan State Action Plan on Climate Change.

Kumar, B.M. and Nair, P.K.R. (Agroforestry Systems and Environmental Benefits).

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