

# Fodder Trees: A Strategic Resource for Sustainable Livestock Nutrition

Sagi Raju<sup>1</sup> and Boini Sravanthi<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Animal Nutrition, College of Veterinary Science, Mamnoon, Warangal, PVNRTGVU, Telangana, India.

<sup>2</sup>M. V. Sc, Department of Animal Nutrition, College of Veterinary Science, Rajendranagar, PVNRTGVU, Telangana, India.

Corresponding Author: [boinisravanthi1998@gmail.com](mailto:boinisravanthi1998@gmail.com)

## Introduction

Agriculture and livestock are complementary sectors that jointly enhance food and nutritional security while generating income and employment in rural areas. With the projected doubling of meat and milk demand in developing countries, there is a significant opportunity for poor livestock producers to increase income. In India, livestock contributes 29.35% to the agricultural GVA and 4.35% to the total GVA (Annon, 2022). However, feed and fodder shortages—35.6% in green fodder, 10.95% in dry fodder, and 44% in concentrate feed—threaten the sector's growth (IGFRI Vision, 2050). This is exacerbated by static fodder cultivation area (8.4 million ha) and rising livestock populations.

Dryland regions are particularly affected due to poor soils and unreliable rainfall, where grain crops are prioritized over fodder crops (Priya et al., 2022). As a result, livestock productivity declines due to poor nutrition. Fodder trees offer a sustainable solution, especially in lean periods, by providing nutrient-rich green fodder and improving ecosystem services like carbon sequestration. These trees can supplement low-quality feeds, enhance livestock productivity, and reduce feed costs sustainably.

Fodder trees and shrubs play a crucial role in livestock feeding, especially under harsh environmental conditions. They are valued for their adaptability to low-input systems, resilience during drought due to deep roots, and their capacity to consistently supply high-protein, nutrient-rich fodder. Compared to herbaceous legumes, fodder trees are longer-lasting, require less management once established, and provide forage especially during lean seasons.

## Contribution of Fodder Trees to Sustainable Livestock Feeding

Fodder trees offer superior nutritional content, with protein levels of 18–25% and high concentrations of minerals like calcium, iron, and zinc significantly more than common grasses thus reducing the need for expensive concentrate feed. Leguminous trees are especially beneficial due to their nitrogen-fixing ability and higher crude protein content. About 25% of livestock diet comes from trees and shrubs, and integrating them into farming systems such as silvi-pastoral models boosts forage yield and land productivity

while reducing grazing pressure and environmental degradation (Ramteke et al., 2021).

## Current Status and Regional Adaptation of Fodder Trees in India

In India, tree and shrub leaves rich in protein serve as vital supplements to low-quality livestock fodder, especially during drought periods. However, not all fodder species thrive uniformly across regions due to varying climate, soil, and altitude conditions (Kumar et al., 2019). Indigenous species, being locally adapted, are often more suitable, although certain exotic species also perform well in favorable areas.

Since the 1950s, both exotic and native fodder tree species have been introduced for livestock feeding, particularly at the Central Arid Zone Research Institute (CAZRI), Jodhpur. Promising exotic species include *Acacia tortilis*, *Prosopis juliflora*, and *Atriplex spp.*, while indigenous species such as *Albizia amara*, *Acacia nilotica*, and *Prosopis cineraria* are also widely used.

Fodder tree development is most prevalent in semi-arid regions, though species like *Leucaena leucocephala*, *Gliricidia sepium*, and *Moringa oleifera* are highly suited for humid tropical zones due to their fast growth and high forage quality. Many of these species are grown in dense hedgerows and harvested regularly for sustainable green fodder supply.

## Potential fodder trees for drylands

In India's dryland regions, livestock rearing is a vital livelihood activity, and tree fodders play a significant role in meeting the animals' nutritional needs particularly during droughts and fodder-scarce periods. Nearly 60% of small ruminants' feed in drylands comes from tree-based top feeds. Fodder trees are well-suited for integration into dryland agroforestry systems like alley cropping and hedgerow planting due to their resilience and ability to provide forage year-round (Manuvanthra et al., 2022).

## Key Fodder Tree Species in Dryland India

### 1. Khejri (*Prosopis cineraria*)

A native multipurpose tree of the Thar Desert, Khejri is known as the "Kalpvriksha of the desert" due to its ecological and economic importance. It thrives in poor sandy soils and low rainfall areas, producing high-quality leaf fodder

('loong') with 12–18% crude protein. It is highly palatable, nitrogen-fixing, and compatible with cropping systems. Fodder yield under agroforestry systems can reach 1500 kg/ha.

## 2. Moringa (*Moringa oleifera*)

Moringa, or Drumstick tree, is a drought-tolerant species rich in protein, beta-carotene, and minerals. Its leaves contain higher protein levels than many traditional protein supplements. It can be propagated easily and is suitable for agroforestry (Rout et al., 2021). Its use improves immunity, productivity, and health in livestock.

## 3. Mahaneem (*Ailanthus excelsa*)

Mahaneem is a fast-growing, multipurpose tree suitable for arid and semi-arid climates. Its leaves are highly palatable and rich in protein (16.25–19.87% crude protein) and essential nutrients, making it ideal fodder for sheep and goats during feed shortages. It integrates well into silvi-pastoral systems.

## 4. Babool (*Acacia nilotica*)

Acacia nilotica is a globally recognized multipurpose fodder tree. It survives in low rainfall zones (400–500 mm) and produces protein-rich pods and leaves (18% crude protein) with a digestibility of 46.2% (Chandran & Athulya, 2021). Its fruits are commonly ground and fed to livestock in several regions.

## 5. Mulberry (*Morus alba*)

Mulberry thrives in varied climatic and soil conditions and yields 25–30 t/ha/year of high-protein leaves (18–25%). It is highly digestible (75–85% in vitro DM digestibility) and rich in calcium and phosphorous. It is used

both as fresh and dried feed, enhancing milk quality and yield in cattle and goats (Venkatesh et al., 2015).

## Conclusion

Fodder trees are vital for sustainable livestock feeding, especially in dryland regions where conventional fodder is scarce. Their high protein content, drought tolerance, and year-round availability make them ideal supplements to low-quality feeds, improving animal health and productivity. Species like *Khejri*, *Moringa*, *Mahaneem*, *Babool*, and *Mulberry* offer substantial nutritional and ecological benefits while integrating well into agroforestry systems. Promoting these trees can bridge the fodder deficit, reduce dependence on costly commercial feeds, and enhance rural livelihoods through resilient and eco-friendly livestock farming.

## References

- Anonymous, 2022: Economic Survey 2021-22. Agriculture and Food Management. Ministry of Finance, Government of India. Retrieved from <https://www.indiabudget.gov.in/economicsurvey/>.
- IGFRI Vision 2050: Indian Grassland and Fodder Research Institute, Jhansi (UP). p. 40.
- Chandran, D. and P.S. Athulya, 2021: A Study of the clinico-haematological profile and therapeutic management of acute babesiosis in a cross-bred Jersey cow—A case report. *Int. J. Pharm. Sci. Rev. Res.*, 68(1): 60-62.
- Manuvanthra, A, D. Chandran, T.B. Emran, M. Aslam, V. Savanth, M. Kumar, R. Sharma, L. A. Silva and R. Sureshkumar, 2022: Dryland livestock rearing relies heavily on tree fodders: A narrative review. *Indian Vet. J.*, 99(10): 7-15.

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