

Fodder Trees as Potential Fodder Source for Livestock in India

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Abstract

Fodder trees are the plants that are cultivated, utilized, and maintained to feed cattle. These were planted to meet the nutritional demands of animals. Fodder trees and shrubs are significant components of ruminant diets, and they have been proven to play key roles in the nutrition of grazing animals in locations where little or no alternatives are available. During the dry season, fodder trees and bushes have been seen to sustain animals such as cattle, sheep, and goats. The function and value of fodder trees and shrubs in livestock production, their nutritional quality, and the reasons that limit their usage in livestock production are discussed in this article.

Introduction

In many developing countries, sustained and high population growth rates, combined with limited and rapidly diminishing land for food and forage production, have created a need to intensify agricultural production in order to bridge the gap between requirement and supply of food and ensure proper human nutrition. Intensification, in the context of ruminant production systems means a broadening of the feed resource base to compensate not only for the shrinking of rangeland and natural grasslands but also for the low quality and seasonal nature of this major feed resource (Panday, 1982).

Some of the alternate feed resources that could complement natural forages include cultivated leguminous and non-leguminous fodder trees and shrubs. The choice of alternate feed resource should not be restrictive but must fit within the existing farming systems, and be adapted to the economic realities of the farmer. Fodder trees and shrubs have been used for generations as multipurpose resources (food, fiber, fodder, timber, wood and live fences) across all of the agro-ecological zones of Africa.

Fodder trees are important feed sources for livestock in a wide range of farming systems in India. Fodder trees are particularly important mainly to feed dairy cows. They can meet production shortages in times of extreme climatic conditions such as droughts. Fodder trees are easy to grow, require little land, labour /capital, have numerous by-products and often supply feed within a year after planting (Robinson, 1985).

Benefits of fodder trees

- ✚ **Fodder trees as power houses for famers:** Fodder trees are used to establish a visible boundary and barrier around each farmer's plot. These living fences selected as fodder should be quick growing, most often comprised of *Calliandra calothyrsus*, *Leucaena trichandra* and *Sesbania sesban*. Once the fodder trees have grown to maximum size, they are trimmed 4-6 times a year, yielding approximately 1kg of dry feed per tree annually. Thus farmer would have enough to feed one cow throughout the year.
- ✚ **Fodder tree leaves as instant feed during lean period:** As the trees' leaves grow upward and outward, they are trimmed and pruned. The first pruning will usually occur 9-12 months after the trees are transplanted from the nursery. The protein-rich green leaves are dried in the sun and then milled into small pieces to be mixed with feed. This practice saves time and money in feeding the animals.
- ✚ **Fodder trees fetches higher profit:** Feeding fodder tree leaves to livestock makes animal healthier and more productive. By feeding tree fodder leaves not only animals are able to produce more milk but consumption of this high-protein leaves raises butterfat by ten percent. A well-fed cow or small ruminants produces high quality by-products and beef meat, which fetch a lot of money at market.
- ✚ **Reduces aflatoxin present in agricultural crops:** Aflatoxins could be found in various important crops that are used as fodder which includes maize and groundnuts or cows consuming the tainted crops. Aflatoxins are extremely harmful to cows and are transferred into a cow's milk supply. A cow exposed to aflatoxins in their feed is likely to become sick, making her unable to produce much milk. When consumed by humans, it has been shown to cause acute toxicity and even death. Aflatoxin primarily impacts the liver, although it can also be found throughout the body in those affected. Liver cancer incidence among human populations is quite common in

Africa country, especially in Kenya. When we use tree fodder crops reduces exposure to toxins are very important benefit.

- ✚ **Fodder trees as climate resilient crops:** Being perennial plants, fodder trees are not susceptible to sudden climatic changes and continue to produce high quality fodder even during drought years when grasses and other annual forages are dry and long gone Their capacity to grow fast enables them to produce large quantities of biomass, which can be used not only for animal feeding but also as mulch in cropping systems
- ✚ **Fodder trees act as soil binders and conserves soil fertility:** Fodder trees control soil erosion, do not compete with food crops for nutrients as their deep root system enables them to tap nutrients from the deeper soil layers, which are generally not available for shallow rooted food crops. They also improve soil fertility by fixing atmospheric nitrogen and have other symbiotic relationships, which enhances uptake of minerals such as phosphorus by plants. In the dry season, fodder trees also provide shade to animals and protect them from the hot and dry weather conditions prevailed during the time of the year. A number of these trees bare fruits, which are used as a source of food for humans. Others have pharmacological properties and have been used to treat a number of ailments at village level.

Agronomic features of outstanding fodder trees

Some of the desirable characteristics of trees and shrubs cultivated for fodder production are easy establishment and rapid early growth in order to compete effectively against weeds, thornlessness and perenniality, high productivity under repeated cutting, grazing or browsing, resistance to local pests and diseases, high seed production ability or reliable vegetative propagation, little or no fertiliser requirement and high production of good quality forage in terms of protein and mineral contents, palatability and digestibility. Providing top feeds from the trees will help to bridge the deficit of green fodder (Paterson et al 1998).

Table 1: Popular fodder trees, botanical name and their habitat

| Sl.No. | Common Name | Botanical Name | Habitat |
|--------|-------------|------------------------------|---------------------------|
| 1. | Subaru | <i>Leucaena leucocephala</i> | Sub humid, Semiarid |
| 2. | Gliricidia | <i>Gliricidia sepium</i> | Humid, sub humid |
| 3. | Ardu | <i>Alianthus excelsa</i> | Arid and semiarid regions |

| | | | |
|-----|-------------|----------------------------------|------------------------------------|
| 4. | Agasthi | <i>Sesbania grandiflora</i> | Arid and semiarid regions |
| 5. | Shevri | <i>Sesbania sesban</i> | Arid and semiarid regions |
| 6. | Khejri | <i>Prosopis cineraria</i> | Arid and semiarid regions |
| 7. | Mahua | <i>Bassia latifolia - Flower</i> | Semi arid |
| 8. | Babul | <i>Acacia Nilotica</i> | Dry and moist tropics |
| 9. | Neem | <i>Azadirachta indica</i> | Dry and moist tropics |
| 10. | Kachnar | <i>Bauhinia variegata</i> | Sub tropics, moist and dry tropics |
| 11. | Safed siris | <i>Albizia procera</i> | Wet tropical and subtropical |
| 12. | Lallei | <i>Albizia amara</i> | Dry tropics |
| 13. | Siris | <i>Albizia lebbek</i> | Moist and dry tropics |
| 14. | Shisham | <i>Dalbergia sissoo</i> | Moist tropics |
| 15. | Mulbery | <i>Morus alba</i> | Moist tropics |
| 16. | Bola | <i>Morus laevigata</i> | Subtropic |
| 17. | Drum stick | <i>Moringa oleifera</i> | Moist tropics, sub humid Humid |
| 18. | Kikkar | <i>Prosopis chilensis</i> | Dry tropics |
| 19. | Ber | <i>Ziziphus mauritiana</i> | Dry and moist tropics |

Table: Quality and nutritional traits of fodder trees

| Sl. No. | Name of the trees | Dry matter (%) | Crude protein (%) | Fibre (%) | Ash (%) | Calcium (%) | Phosphorus (%) | Energy |
|---------|-------------------|----------------|-------------------|-----------|---------|-------------|----------------|--------|
| 1. | Acacia | 29 | 15.1 | 22.6 | 8.2 | 1.21 | 0.06 | 8.4 |
| 2. | Cassava | 21.1 | 24.2 | 15.6 | 6.6 | 2.62 | 0.20 | 14.4 |
| 3. | Calendar | 29.4 | 24.0 | 21.7 | 8.0 | 1.6 | 0.20 | 12.6 |
| 4. | Erythrina | 32.0 | 25.8 | 17.4 | 6.7 | - | - | 14.3 |
| 5. | Ficus | 17.0 | 14.0 | 22.6 | 5.8 | 1.31 | 0.17 | 12.0 |
| 6. | Gliricidia | 25.0 | 14.7 | 19.9 | 4.7 | 1.58 | 0.29 | 12.8 |
| 7. | Jack Fruit | 36.6 | 14.0 | 22.1 | 11.5 | 1.46 | 0.15 | 14,2 |
| 8. | Leucaena | 30.0 | 22.2 | 19.6 | 4.4 | 0.27 | 0.12 | 12.1 |

| | | | | | | | | |
|-----|------------|------|------|------|-----|------|------|------|
| 9. | Pigeon Pea | 25.2 | 22,8 | 20.1 | 5.8 | 0.37 | 0.17 | 13.4 |
| 10. | Prosopis | 23.6 | 14.0 | 17.8 | 6.8 | 2.73 | 0.15 | 11.2 |
| 11. | Sesbania | 18.0 | 22.6 | 18.4 | 9.3 | 1.48 | 0.34 | 13.6 |
| 12. | Tamarind | 28.0 | 14.9 | 21.0 | 8.6 | 2.81 | 0.24 | 14.4 |

Limitations of fodder trees as a feed resource for animals

The main limitation to effective utilisation of fodder legumes as feed for ruminants is the high content of tannins and other anti-nutrients such as saponins, cyanogens, mimosine, coumarins, *etc*, which limit nutrient utilisation. The most widely occurring anti-nutrient in plants is a group of polyphenolic compounds commonly called as tannins. Tannins limit animal performance by suppressing intake and digestibility of forages. They bind feed proteins and enzymes to form feed protein-tannin complexes, which are resistant to both rumen microbial and enzymatic degradation. They also lower enzyme activity. These compounds also enhance the loss of endogenous proteins, which affect overall nitrogen metabolism in the animal. It may also be noted that at lower levels (2-4%) of tannins, these could have beneficial effects on ruminant animals, suppress bloat in ruminants and reduce excess degradation of high quality protein in the rumen (Thapa et al., 1997). It must be emphasised that the purpose of pointing out the potential toxic effects of these compounds is to be aware of their presence rather than to discourage the use of fodder legumes by ruminant animals. In order to minimise the detrimental effects of tannins and phenolic compounds in fodder legumes, several suggestions have been put forward, some of which can be applied are. Post-harvest processing techniques such as sun-drying and wilting of forages before they are fed to animals. Conservation of fodder into bags or ensiling them in silo pits with other feed resources has also proved beneficial in minimising the detrimental effects of tree fodder legumes. Enhancing the use of fodder legumes is through mixing of fodder with other feed resources such as crop residues. This helps to dilute the overall concentration of tanniniferous compounds in the diets thereby minimising their effects.

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