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Tree Based Fodder for Livestock - A Contingent Feed Source

The area under fodder crops in India is 8.6 million ha. which is less than five per cent of the area under cultivation in the country. Green fodder supply in twenties is reported to be 406 million tonnes whereas the demand is 1134 million tonnes. This shows a deficiency by 65 per cent of the demand in India. Additionally, the major concern with regard to feeding livestock arises due to the lower yields of field fodder crops during hot summer. In this scenario, tree fodders act as an important contingent fodder source for livestock. Various tree fodders *viz.,* subabul, gliricidia, bauhinia, calliandra, mulberry, *etc.,* serves as potential feeding source for livestock in our country. Use of tree fodders has numerous advantages *viz.,* easy to grow, available round-the-year, reduced feed costs, improvement in soil properties, cattle production per hectare *etc.*

INTRODUCTION

The total livestock population in India is 535.78 million as per the 20th Livestock Census released in 2019. It has shown an increase of 4.6 per cent compared to the previous Census in 2012 (Livestock Census, 2019). The area under fodder crops in India is 8.6 million ha. which is less than five per cent of the area under cultivation in the country. Green fodder supply in twenties is reported to be 406 million tonnes whereas the demand is 1134 million tonnes. This shows a deficiency by 65 per cent of the demand (Kumar et al., 2012). Consequently, in order to sustain the livestock and poultry productions in the areas of severe drought periods and temperate agroforestry, tree by-products are to be used for animal feed complementation (Jose, 2019).

Protein is one of the most essential daily feeding requirements for the growth and milk production in livestock. But, livestock is repeatedly fed with poor-quality roughage or grasses (*viz.,* napier-grass), which has low amounts of protein. So, it is recommended to supplement the basic diet with concentrates (dairy meal) containing enough protein (about 160 grams in 1 kg). Fodder tree leaves can serve this purpose as they contain high quantities of protein, ranging from 10-30 per cent of the 'Dry Matter'. They can thus replace concentrates to a great extent and become an economical source of protein supplementation. Additionally, the environmental footprint of animal-based dietary product can be reduced by identifying and adopting systems that integrate livestock with crops and trees (Lal, 2020). FAO (1994) reports that animals fed on tree fodder together with grasses will be healthy, grow faster than those that are fed only on grasses.

The major concern with regard to feeding livestock arises during the hot summer when field fodder crops produce poorer yields. Especially, the situation will be even worse in drought years. Hence, tree fodders act as an important contingent fodder source for livestock. Moreover, livestock separated from the growing of crops and perennial trees can cause severe environmental issues *viz.,* soil health degradation, eutrophication of water, loss of biodiversity, emission of greenhouse gases into the atmosphere, *etc.,* (Peyraud *et al.,* 2014).

Trees and shrubs play a crucial role in the lives of farmers as well as their livestock. They are optimally structured to build soil and ecological health around their own deep roots, and their leaves and branches can benefit the farm food chain. The whole tree serves as a windbreak, provides shade, and also controls soil erosion. Integration of tree based farming system with livestock is a form of mixed production system which utilizes trees & livestock in a way that they can complement one another through space and time. The backbone of an integrated system is the herd of ruminants (animals like sheep, goats or cattle) which graze a pasture to build up the soil. The critical role of trees and shrubs in livestock production system is now being well recognized by the scientific community in developing countries and a large number of species have been evaluated and worked in India.

VARIOUS TREE FODDERS FOR LIVESTOCK

SUBABUL (*Leucaena leucocephala*)

It is considered as the best tree fodder. It can be used for green manuring, fire wood and wood pulp. It grows well in low rainfall areas and slowly in heavy rainfall areas. It is suitable for leaf meal production as well. But, the herbage from big trees creates problems in pregnant cows due to a negative substance called "mimose". Hence, regular lopping of the plants at 5-6 feet is required when it is used for fodder purpose. Subabul resists repeated lopping and the branches should be harvested prior to flowering in order to prevent it from growing as a weed in farm by self-seeding.

CALLIANDRA (*Calliandra* spp.)

This leguminous plant species has its origin from Indonesia. It can be suitably used as fodder, green manure & fire wood. Calliandra is a soft, palatable and proteinaceous fodder. It has the capacity to withstand repeated lopping and multiplication is generally by seeds. It is available for cutting 3-4 times in a year. Care should be taken not to continuously feed calliandra in large quantities as it creates infertility in dairy animals. Hence, the recommended feed is 5kg/dairy animal/day

GLIRICIDIA (*Gliricidia sepium*)

Gliricidia is a leguminous plant rich in protein. It is grown in fences and bunds of farm. The stem of this tree fodder is thick and hard. Hence, chopping is essential prior to feeding. Freshly cut leaves of the tree have a bad odour which is generally disliked by dairy animals. Hence, the leaves are allowed to wilt for a brief period of time and later fed to the animals.

BAUHINIA (*Bauhinia purpurea*)

This leguminous tree commonly known as butterfly leaf (*Bauhinia purpurea L*) contains high crude protein. Their pods contain pea-like seeds and an edible pulp. Leaves of bauhinia are also edible and can be used to relieve thirst. It is a good companion for *Grewia, Annona*, and *Combretum* species. It can be intercropped with maize provided that its leaves are pollarded to reduce shade. Multiplication of bauhinia is by stem cuttings. It is palatable to cattle, sheep and goat. The leaves of Bauhinia have a fairly high tannin content of around 1.5 per cent.

RAIN TREE (*Samanea saman*)

This avenue tree is generally seen planted on the road sides. It is considered as a good leguminous fodder species. The tender leaves of rain tree are readily liked by buffaloes and the abundantly available pods of Rain tree can also be used for feeding the dairy animals.

SESBANIA (*Sesbania sesban*)

Sesbania is a proteinaceous and edible tree fodder. It is popularly grown as a wind breaker in banana plantations and as support and shade plant in betel wine plantations. It withstands repetitive lopping and offers good regrowth. This tree gives higher yields of fodder if provided with regular irrigation.

MULBERRY (*Morus alba*)

Mulberry is a popular green fodder in its traditional belts. It has a hard stem which needs to be finely chopped before it is fed to the livestock. Continuous feeding of mulberry on a large scale causes infertility and lowers milk yield. Therefore, the recommended feed quantity of mulberry is 2-3 kg/day/animal.

MELIA *(Melia azedarach)*

It is a widely known fodder tree in the rural areas. Their tender leaves & fruits are given to sheep, goat and other cattle. It resists repetitive lopping and grows very fast. Fruits of Melia may be fed on a controlled basis.

JACK FRUIT (*Artocarpus heterophyllus*)

It is a nutritious fodder. Jackfruit trees produce fruits which are so nutritious and can supplement diets in cattle, goats, chicken and pigs. Therefore, people with limited land can include trees of jackfruit on their farm lands (silvopastoralism) which is cheaper. The unique feature of Jack fruit is the fact that it produces huge fruits directly from the stem. Jackfruit is utilized as livestock feed as it is a rich source of protein and energy. Moreover, goats are commonly fed with the leaves of Jack fruit as they are well liked by them.

ARECANUT (*Areca catechu*)

In traditional arecanut growing areas, leaf sheath of Arecanut is used as fodder. It is initially dried, finely chopped, and later fed to the animals. The experience of farmers indicates improvement in milk fat by feeding arecanut leaf sheath to livestock. Wet sheath should not be fed to the animals as it creates problem in mastication due to the thin upper layer like plastic.

FIG (*Ficus carica*)

The fruits and herbage of fig can also be used as fodder. Figs are one of the most palatable of all the available feeds. The high sugar content of figs is suitable for producing concentrate feeds by adding them to other grains and mill feeds that are enjoyed by dairy cows. The only limiting factor for the use of figs in dairy mixture is that, like most other fruits, figs also have laxative properties (Alison, 1949). Hence, over-feeding of figs causes scouring, especially when the cows are on green feed. It is best to feed not more than 5 kg/animal/day.

COCOA (*Theobroma cacao*)

Rinds of the cocoa fruits are generally fed after extracting the beans inside. Fresh pods are generally consumed by livestock. But, in order to ensure that the animals consume sufficient quantities of feed, pods of cocoa must be sun dried (at least to 60% moisture content), later chopped, ground and pelletized. Pod meal can be fed to cattle in quantities of up to 7 kg/ day/ animal without any toxic effects (FAO, 1994).

ADVANTAGES OF FEEDING TREE BASED FODDER FOR LIVESTOCK

Feeding tree fodder have the following advantageous characteristics *viz.,*

- Can be easily grown
- Requires little labor, land and capital
- Availability numerous by-products
- Low irrigation and maintenance is required
- Supplies feed within a year after planting and available round-the-year
- Provides shade to cattle
- Grows well with application of manure obtained from livestock
- Efficient utilization of available land, increase in water and nutrient use efficiency
- Reduction in feed costs
- Improves cattle production per hectare
- Improves soil properties
- Improves Nitrogen fixation
- For cleaner cattle production
- Improves animal welfare (Yadav, 2019).

CONCLUSION

Trees and shrubs have a deeper root system which has the potential to tap water beyond the reach of grasses and other forage crops. This characteristic of

trees and shrubs enables them to remain green for a longer period of time and supplement the energy and protein required by livestock round-the-year especially during the dry periods. The performance of fodder trees differs from one particular location to the other depending on varied climatic conditions, (*i.e.,* temperature, rainfall, humidity, *etc.*), altitude and soil types. Therefore, it is important to select suitable types for a particular area. As majority of Indian farmers have small and marginal landholdings, fodder trees and shrubs may be integrated with the existing cropping systems rather than planting them in pure-stand (mono-culture) fodder banks for sustainable livestock production in our country.

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