

Enhancing the Land Value by Using Fodder Trees

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Introduction:

In India, there is acute scarcity of concentrates (44%), green fodder (36%) and dry fodder (11%) for livestock feeds (IGFRI VISION 2050). This situation is created by periodical rainfall, confined to the monsoon season. These estimated are not however, included the feed resources from fodder trees. Approximately 1.2 billion people (20% of world population) depend to a large extent on agroforestry products and services for their survival. Total area under agroforestry in the world is 307 million hectare and in India it is 25.32 million hectares. Approx. 38 billion tons of carbon could be sequestered (35 billion ton by afforestation & 2.5-3 billion tonnes through increased agroforestry practices) during next 50 years. In one survey 56 agroforestry practices have been found more profitable than sole cropping and in 40% of cases, financial returns were at least 25% more than sole crop.

Table 1. Demand and supply of fodder in India (in million tonnes) over the years.

Year	Demand		Supply		Deficit		Deficit as (%)	
	Green	Dry	Green	Dry	Green	Dry	Green	Dry
2010	816.8	508.9	525.5	453.2	291.3	55.72	35.66	10.95
2015	851.3	530.5	590.4	467.6	260.9	62.85	.65	11.85
2020*	911.6	568.1	687.4	500.0	224.2	68.07	24.59	11.98
2025	954.8	594.9	761.7	524.4	193.0	70.57	20.22	11.86
2050	1012.7	631.0	826.0	547.7	186.6	3.27	18.43	13.90

Figures are projections.

Source: Based on Xth Five-Year Plan Document, Government of India

Fodder tree:

Fodder trees deal with tree and shrubs mainly or partially grown to provide fodder for livestock. Fodder tree leaves referred as “top feed” and considered as emergency animal

fodder. FAO, as an advisory and executive agency of the UN system, considers this expert consultation on fodder tree as a key event towards coordinate efforts all over the world to promote fodder tree and fodder shrubs as a means of improving livestock feeding and also of moving toward sustainable agriculture.

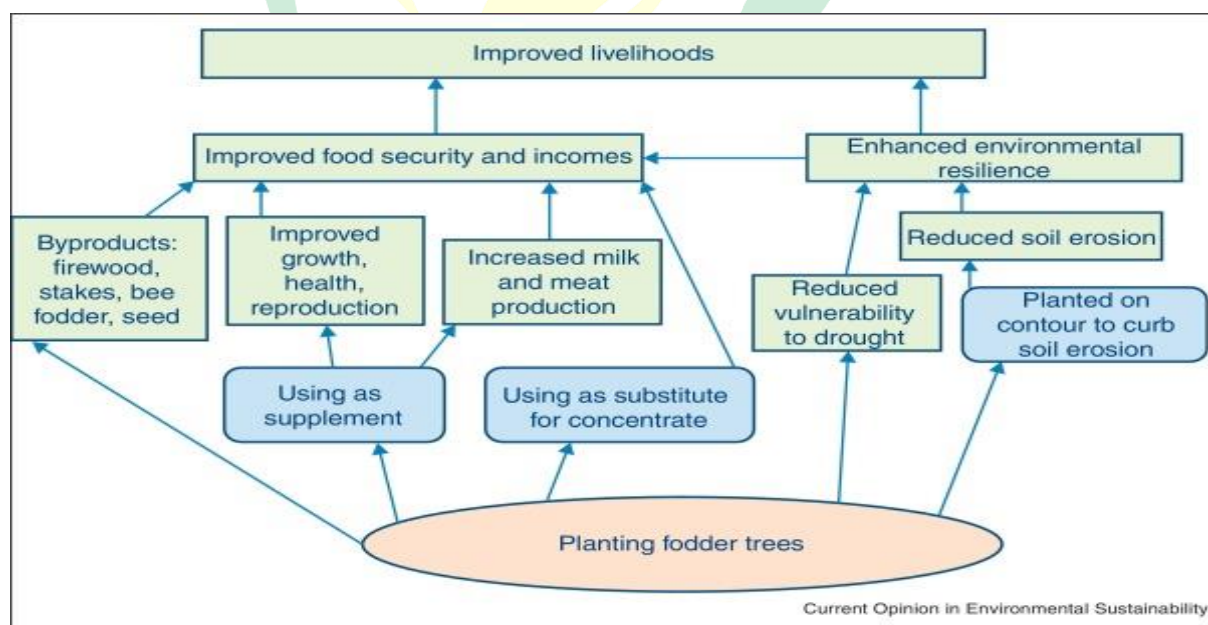
Major reasons for growing fodder trees:

1. Fodder trees provide a cheap protein source: For growth and milk production, protein is a major requirement in the daily feeding ration. Fodder tree leaves contain high quantities of protein thus they replaced concentrates to a great extent and become a cheap source of protein supplementation.

2. Fodder tree leaves used as a dry season supplement: During the dry periods trees and shrubs remain green for a longer period than grasses because of their deeper rooting system, which can tap water beyond the reach of grass roots. So, when the availability of grass declines as it dries up and its protein content decreases, the fodder trees are still green and can provide the required energy and protein.

3. Fodder trees also have other uses: Some fodder tree species improve soil fertility by providing green mulch or by fixing atmospheric nitrogen or they provide construction material, firewood, shelter, shade or edible pods.

Role of fodder trees:



- Leguminous fodder trees or shrubs have the ability to fix atmospheric nitrogen required to improve soil fertility and animal productivity.
- Fodder tree banks do not provide 100% of feed requirements but supplement available low-quality pasture with high quality protein.
- Their deep and lateral rooting habit provides a structure that stabilizes the soil and the leaf fall from these trees enriches the soil.
- Fodder trees have higher biomass yields, better resistance to mismanagement and a capacity to retain high quality foliage under stress conditions compared to herbaceous pasture legumes.
- Provision of firewood.
- Reforestation in areas where many trees have been cut down.
- Alley cropping whereby the multi-purpose trees are planted as single rows in a field of food crops.
- Hedgerows, contour strips, bund stabilizers.
- Source of income (seed, seedlings, silage, leaf hay and fuel)

Maintaining soil health through fodder trees: Fodder trees in agroforestry farms increases land value by improving soil fertility through control of erosion, maintenance of soil organic matter and physical properties, increased N, extraction of nutrient from deep soil horizons, and promotion of more closed nutrient cycling.

Why should we go for fodder tree practices?

- Because fodder tree increases nutrient input from the atmosphere and deep soil layers
- Soil Carbon sequestration.
- Reclamation of degraded lands
- Maintains and improves soil physical properties
- Biological nitrogen- fixation through trees
- Amelioration of acidic and alkaline soils
- Closed nutrient cycling and efficient use of nutrients
- Controls erosion and reduces losses of SOM

Common fodder trees:

1) *Leucaena leucocephala*

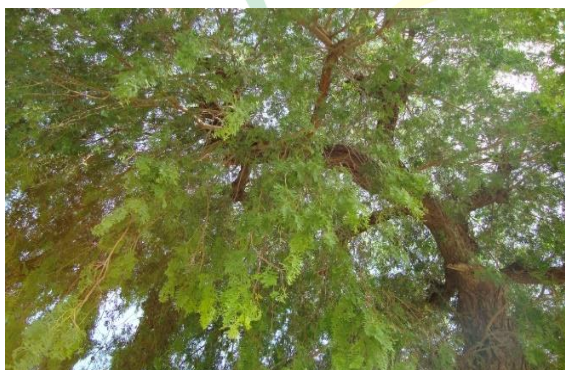
- Known as Miracle & conflict tree. small fast-growing tree native to Southern America

- Provide feed for animals
- Used for firewood or charcoal production
- Improve soil fertility by nitrogen fixing as 500 kg/ha/year
- Food for human consumption
- Pulpwood for paper industry



2) *Prosopis cineraria*

- The tree provides fodder during the extremely dry summer months when most other trees are leafless.
- Its pods, containing a dry sweet pulp, also provide good fodder.
- The trees are planted for sand dune stabilization and reclamation.
- It also fixed atmospheric nitrogen
- It is an excellent fuel, also giving high-quality charcoal (5,000 kcal/kg)



3) *Gliricidia sepium*

- Is a medium sized legume tree, mostly deciduous during dry season but is reported to remain evergreen in humid areas
- Beside as green feed it is suitable to make silage from copped forage, which may be mixed with grasses/maize.

- It is similar to subabul but less sensitive to pest.

Uses:

- 1) It can be used for various purposes such as live fence, fodder, coffee shade, firewood, and green manure
- 2) It fixes nitrogen in the soil, so it boosts crop yields significantly without chemical fertilizer.

**Fodder tree production models:**

- 1) **Fodder bank systems:** Trees are planted as close as 1 m × 1 m and are cut regularly to induce maximum herbage production. The cut herbage is usually carried to animal feeding stalls; sometimes sheep or goats are brought to the plots and allowed to forage on the cut branches of naturally-growing fodder. The system is called fodder bank, which provides reserve fodder when it is in short supply, usually in the dry season.
- 2) **Protein bank:** In Silvi-pastoral system various multipurpose trees (protein rich trees) are planted on wasteland and rangelands for cut and carry fodder production to meet the feed requirement of livestock during the fodder deficit period in winter. Commonly used species include *L. leucocephala* and *G. sepium*.
- 3) **Three-strata forage system:** This is another type of fodder bank; it involves the planting of forages, shrubs and trees to form three canopy layers or strata in a unit of land. Pasture grasses, vines and herbs occupy the lower strata; shrubs occupy the middle strata and trees occupy the upper strata. The combination of grasses and trees can ensure year-round supply of fodder.
- 4) **Live fence or boundary systems:** Single or double rows of fodder trees are planted along farm boundaries. The trees have the dual purpose of providing fodder and serving as live fence posts. If intended to enclose animals, the trees are usually planted densely, as in hedges, to prevent animals from getting out. In some cases, thorny species are planted as thick hedges

to prevent livestock from straying into crop plots and also to fence them off from wild animals.

5) Hedgerow intercropping systems: Fodder trees, mostly leguminous are planted as hedges in single, double or triple rows. The spaces in between hedgerows are planted with pasture grasses. As in fodder banks, herbage may be cut and carried to animal feeding stalls. The more common practice is to let the animals forage on the cut tree branches and pasture grasses.

Prospects of fodder tree as an alternate land use option:

- Fodder tree may be a leading forage option to supply quality fodder for the livestock.
- Fodder tree will act as life line for dry region of the world.
- Due to high palatability and nutrition, it may act as feed supplement and maintenance diet, even in non-traditional areas.
- Due to their role in reclamation of wastelands and denuded areas, these may be treated as engine for ecological restoration and balance and there by offsetting the ill-effects of climate and land use change.
- Fodder tree may act as direct positive support for marginal communities and areas by rendering ecological services as well as serving other commercial interests besides sustaining forage security.

Table 2: Nutritional value of some fodder trees

Fodder tree	Crude protein	Crude fibre	Ether extract	Total ash
Subabul	22.2	19.6	6.9	4.4
Moringa	15.8	35	2.35	7.61
Gliricidia	25.0	19	4.2	10
Mesquite	12	25	3.2	9
Babul	15.1	22.6	8.9	8.2
Khejri	15	17.6	2.1	6.8

FAO, REPORT, (2015)

Conclusion:

Subabul, Neem, Anjan, Ber and *Khejri* tree provide nutritious off-season fodder for sheep, goat and camels in addition to fuel wood and timber while enriching and protecting underneath soil by increasing organic carbon and available nutrient through litterfall and also

generating employment for rural masses. Fodder trees play an important role within the farming systems and contributing significantly to soil maintenance and fertility, as well as livestock production, particularly as dry season feed resources. These are ideal for growing on wastelands, problem soils, undulating lands, farm boundaries, field bunds, waysides and dry areas. From the foregoing discussion, it can be concluded that fodder tree based alternate land use options may be a boon for achieving forage security and land sustainability and through all these features of fodder tree ultimately will increase land value.

Honorable Prime Minister's Mantra for Achieving the Goal of Doubling Farmers

Income: The Honorable Prime Minister frequently uses the phrase “*HAR MED PAR PED*” which means “trees on every field bund/boundary”. A Sub-Mission on Agroforestry (SMAF) with an outlay of Rs. 940 crores have recently been initiated in 2016-17 will increase farmer incomes.

Growing trees on farms has multiple benefits: -

- 1) It allows integration of trees, crops and livestock on the same plot of land
- 2) Creates additional income for farmers
- 3) Restores barren land
- 4) Repair soils and helps to fight global warming
- 5) Reduce poverty and malnutrition
- 6) Make their farming system more climate resilient and adaptive

Future Thrust:

- ❖ Rising population, shrinking land resources and more diversion of cultivated lands in to developmental as well as commercial activities, commercial uses of trees, poses serious challenge for adoption of fodder tree option.
- ❖ Nutritional profiles of fodder tree should be prepared and anti-quality substances need to be removed, so as to ensure the safe feeding for livestock.
- ❖ In fodder tree disease and pests management is also difficult as compare to traditional forage crops. Thus, it requires great knowledge and understanding on part of both researchers as well as cultivators of fodder tree.
- ❖ During initial years, fodders tree requires special attention due to germination and establishment issues.



- ❖ Development of suitable propagation materials for marginal and degraded wasteland areas is a big thrust.

