

Trees: Sustainable Fodder Source For Livestock

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Trees are best friends of farmer enriching soil fertility for next coming plant generation and feed for livestock species on Earth. Agroforestry does help in reducing feed cost of growing livestock population but it is essential for one to have knowledge of tree species which needs to be grown for advantage. Forest Garden Approach emphasizes on restoring and protecting land by designing and planting of diversified plants along with fodder trees for sustainability of animal and continuous income for farmer in form of milk, meat, fruits, timber etc. Trees provide nutrition to animals as these are rich in minerals like sulphur, chlorine, zinc, calcium, potassium, phosphorus. Research indicates that it helps farmer in making saving upto 65% of gross revenue which farmer spends for purchase of commercial feeds. Cut and carry forage system gives both farmer and animal satiety which is essential for bonding of farmer with his animal. Moreover, one acre forage land is sufficient for fodder supply of 20 cow calf units in confinement cut and carry system although it also depends on planting density and rainfall. There are various advantages of cut and carry system in livestock production system. Increase in feed efficiency, gain and productivity, health system, immunity, products (meat, milk) quality, efficient land use and manure management, marketing system with improved soil fertility and preserving biological ecosystem along with reduced feed input cost and freedom for children to attend school has been noted. The disadvantages of forest garden cannot be overlooked which includes requirement of high labour, inability to form balanced diet using tree leaves, change of taste and quality of milk, unpredictable production, need for mineral supplements with constraints in processing, storage of feed during monsoon. But still trees are cheap source of feed for our animals and knowledge of different trees which can be used as fodder is a need of hour today of our farmers which have been discussed here.

The main aim of forest garden approach is to protect, diversify and optimize cultivation to increase food security for human and animal and generate income sources. Best forages leaves with high protein content are found on trees of tropical region. One needs to select best species for cultivation for providing quality forage for animals. Trees also act as wind barriers, help in controlling soil erosion and pests entry, provide farmer with diverse needs like fuel wood, fertilizer. Fodder trees having nitrogen fixing ability can be planted near fruit trees and gardens filling gaps in field which also provide fodder during lean period. Mostly fodder trees are planted with 30cm spacing and 2metres apart depending on purpose and species in rows or

lines, perimeters or contour strips. In hedge rows, usually plantation is done in two rows which are staggered with 30-50 cm spacing while for wind break purpose plantation is done at 1 metre apart.

Selection of forage species: Animals require protein, macro and micronutrients which can only be provided using diverse feed ingredients in diet. Considering specific climatic conditions, soil texture, growth characteristics of plant, usage versatility, nitrogen fixation, palatability, protein content and digestibility plantation of tree species needs to be done. Sometimes chemical compounds in fodder may result in illness and may become cause of death. One single fodder species should be used in diet up to only 30% in ruminants and 5-10% in non-ruminants. Fodder species producing leaves even in long dry season should be selected for plantation.

In order to process and store leaf fodder, forage trees needs to be cut once height of 2 meters is attained and at every 0.5-1 meter re-growth. During rainy season the cutting is done at every 2 week interval while in dry season, reduced harvesting is done. Factors like season, available technology, product (leaves, cake, pellets, meal etc), animal preferences and transportation facility to market do affect processing and storing process but feeding of fresh forage to livestock is best being rich in most nutrients. Shade drying is recommended on raised platform or screens for proper ventilation. Silage can also be prepared for feeding in scarcity conditions of green fodder. Leaf meal use is also an option for dry season.

Calliandra calothyrsus: The protein content in leaves is 24% and 35-40% digestible, so used to supplement mostly grasses of low nutritive value or for replacing commercial feeds. Though this plant is unable to tolerate frost still it can adapt to varied soils. Calliandra is shade loving and fixes nitrogen, mostly relished by goat but also has high tannin content. Ruminants can tolerate more in diet compared to non-ruminants. In poultry and rabbit's diet can be included upto 5% while in other can be added upto 30% of diet.

Leucaena trichandra: prefers soils which are well-drained. The protein content in forage ranges between 17-33%, being nitrogen fixing tree, disease tolerant, can well do in cooler climate and have nutritional content less than Leucaena Leucocephala. Tannin and digestibility differs with seed source. It grows well with fodder grasses.

Sesbania sesban/grandiflora: It can fix nitrogen being fast grower and has high protein (15-20% and 75-90% invitro digestibility). It helps in improving soil and can tolerate light frost. It is popular fodder tree although short lived.

Morus alba: It is excellent fodder in cut-carry system having protein 15-25%, 75-80% digestibility being palatable and frost tolerant. It should be grown with nitrogen fixing species as it is valuable for silk worm production and edible fruits.

Leucaena leucocephala: The fodder of this tree has capability to increase milk production and growth rate in animal because leaves are palatable, rich in protein (27.5%), and vitamins (A& B). It is nitrogen fixing tree, so recommended for intercropping and has fast regrowth in dry season.

Leucaena pallida: It is rich in protein (29-35%CP) and digestibility (55-64%), can tolerate light frost, and fixes nitrogen, psyllid resistant although high tannin limits its use as fodder. It grows well in well drained soil having neutral to alkaline pH.

Leucaena diversifolia: It fixes nitrogen and is highly palatable with protein 25-32% although being light frost tolerant and psyllid resistant. Tannin level affects digestibility. It can be included upto 30% in ruminant but avoided for use in diet of non ruminants. It has capability of making good fuel wood and charcoal.

Since all *Leucaena* species contain mimosine, it cannot be fed to horses and mules, although its use is restricted to 25% in sheep and goat diet.

Senna siamea: It grows well in humid environment and is frost susceptible but requires full sunlight for maximizing production. Mostly relished by goats but secondary compounds in plants limit its use in diet of poultry and pigs. The plant can be good source of medicine, fuel and textile.

Chamaecytisus palmensis (Tree Lucerne or Tagagsaste): It can grow on various soil types with deep roots but best performance on sandy well drained soil. It is palatable, can fix nitrogen, with 20-30% crude protein, 77-82% digestibility. It is sensitive to fungal diseases.

Gliricidia sepium: It cannot tolerate water-logging or frost but resist soil pH changes and fixes nitrogen. It contains protein (18-30%).digestibility (60-65%) and is less palatable, so mostly given along with other forages. In diet of nonruminants included upto only 10%.I produces termite resistant timber which is good for making furnitures.It is also grown as green manure because leaves are nitrogen rich.

***Cajanus Cajan* (Pigeon pea)**: It can resist drought, high temperature and can be grown on acidic sandy or alkaline clay soil. Being palatable, protein rich (15-24%) mostly harvested when pods mature but given to animal combined with other feeds. When given 3-4Kg/day mixed with grass like Napier can result in weight gains in animal.

***Pennisetum clandestinum* (Kikuyu grass)**: It shows best performance on fertile soils being pH tolerant. This grass can be used for silage and hay making. Overconsumption after long dry spells can lead to toxicity.

***Pennisetum purpureum* (Napier or Elephant grass)**: It needs to be supplemented with other fodders for attaining milk production and weight gain. It can also be used for silage and hay making. It grows best in alley cropping along with leguminous shrubs.

Desmodium intortum: It contains 16-24% protein, 55%digestibility but tannin reduces the palatability. It can grow on fertile soil in cooler areas.

Conclusion:

Preservation of our natural resources mainly flora and fauna is essential to feed our growing human and animal population. Judicious use of available feed resource is only solution to feed for future.