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Shrinking grasslands and means to combat fodder scarcity

in the hilly region of the Nilgiris

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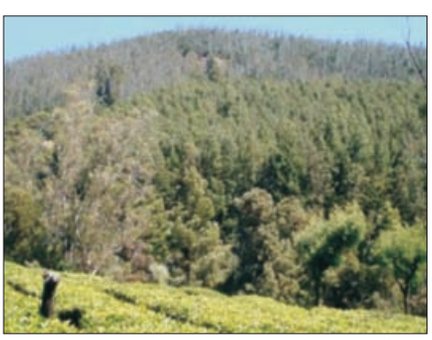
Sheep Breeding Research Station, Sandynallah, The Nilgiris

Steps to fulfill the fodder requirement of livestock have to be thought of to sustain livestock enterprises, which form the source of livelihood for poor and marginal farmers. The models to augment fodder production cannot be universal and will depend on the geography and agro-climatic conditions prevailing in the region. The shola and grassland ecosystem is unique to the region and has served as source of fodder for the native livestock species like the Toda buffalo *and* Nilgiri sheep. *However, large areas of grasslands have been lost due to plantations with tea and eucalyptus trees. As a result there is acute shortage of fodder for livestock, which has even led to endangerment of precious livestock breeds. The paper describes the current status of fodder availability, reasons for shortage and possible alternate solutions in the form of new fodder varieties.*

Key words: Fodder, Grasslands, Legumes, Hilly region



Natural grasslands at Sheep Breeding Research Station, Sandynallah.



Grasslands replaced with eucalyptus, Pinus and tea plantations



Frost causing 'burnt grass' in pasture

IN India most of the livestock are maintained under an extensive system of management, as the genetic make up of the animals are adapted for less production and better survivability. Hence, grazing forms the most important source of nutrition for the animals. The Nilgiri hills of Tamil Nadu is the point of confluence of the western and eastern ghats of peninsular India. It is a biodiversity hot spot which boasts of not only numerous wild fauna and flora but also indigenous species of livestock like the Toda buffalo, Nilagiri sheep and native ponies. The shola and grassland ecosystem is unique to the region. Grasslands of the plateau are covered with many species of grasses, which in combination with the shola forests, serve as important source of fodder and water, prevent soil erosion and play a significant role in combating global warming. In fact, other than the Mukurti National Park, grasslands have been conserved only in the livestock farms and Toda tribal hamlets, where grazing has been continuous. However, large areas of grasslands have been lost due to plantations with tea and eucalyptus trees. As a result there is acute shortage of fodder for livestock, which has even led to endangerment of precious livestock breeds.

The topography of the Nilgiris imparts a typical climate, with severe frost during winter. Frost burn

Table 1. Nutritional composition of different fodder varieties in the Nilgiris

Fodder type	Crude protein	Ether extract	Crude fibre	Total ash	Acid insoluble ash
Kikuyu grass (*Pennesetum clandestinum*)	7.98	1.53	28.64	9.72	8.02
Maize (*Zea mays*)	8.64	1.67	32.43	8.58	7.7
Oats (*Avena sativa*)	9.67	1.63	34.38	8.63	6.28
Phalaris aquatic	7.43	1.77	15.31	5.79	-
Rye grass (*Lolium perenne*)	11.86	3.08	14.37	8.06	7.04
Berseem (*Trifolium alexandrium*)	17.38	0.67	26.81	14.61	11.84
Maku lotus (*Lotus uliginosus)*	15.72	2.63	22.44	8.40	-
Tree Lucerne (*Chamaecytisus palmensis*)	19.67	2.98	21.67	10.33	4.82
Carrot tops (*Daucus carota*)	14.40	2.51	15.08	18.92	2.02

damages most of the grasses and other crops leading to severe fodder shortage during winter. Fodder management practices should thus be formulated to ensure availability of fodder all through the year, including winter. Some of the farmers understand the consequences of inadequate feeding of animals. They purchase fodder from the plains during lean months, while majority of the livestock are underfed during this period. Such short periods of feed deprivation result in irreversible or prolonged loss of production and reproduction in livestock.

Fodder varieties suitable to the region

Natural pastures: The natural grasslands comprise of a mixture of several species of grasses in genera *Bothriochloa, Ischaemum, Themeda, Cymbopogon, Bromus, Brachypodium, Andropogon, Heteropogon, Sporobolus, Arundinellah, Paspalum* etc. Natural grasslands when available, provide sufficient nutrition to the grazing animals.

Grasses

One of the significant steps towards fodder management for the region was the introduction of *Kikuyu* grass (*Pennesetum clandestinum)* from Kenya. This grass was first imported from Australia for the Military Dairy Farm at Wellington. After successful establishment, it has spread to other parts of the district and is known as '*Seeme pillu*' in the local language meaning foreign grass. The grass is suitable for use as green fodder and in pasture as well. It grows at altitudes over 1,200 m above mean sea level. *Kikuyu* grass is very palatable and nutritious to all kinds of livestock and has the ability to replace the coarse grasses in natural grasslands. In most of the Toda *munds, Kikuyu* grass has replaced the grasslands immediately surrounding cultivated area.

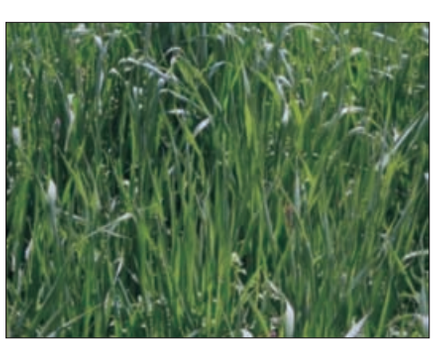
The bunds surrounding horticultural fields are usually covered with *Kikuyu* grass and this is harvested as green fodder. Most of the dairy farmers rearing crossbred cattle were entirely dependent on this grass for green fodder. However, the grass is sensitive to frost burn and is damaged during winter. Horticultural lands have become so valuable that farmers no longer spare the bunds for *Kikuyu* grass. The cost of labour for de-weeding the fields off Kikuyu grass has increased and weedicides are being used. This has resulted in a drastic reduction in area under *Kikuyu* grass, thus widening the gap between need and availability of green fodder.

Cultivated fodder: Maize (*Zea mays*) and oats (*Avena sativa*) are important high-yielding annual cereal fodder crops for the region. African tall variety of maize is suitable as fodder variety and can yield up to 37 tonne/ha. Oats is also frost resistant and can be cultivated as irrigated crop during winter. Kent variety of oats is found suitable for the region and gives an yield of about 14.82 tonne/ha /cutting. *Phalaris aquatica,* a frost resistant perennial grass, thrives well and yields fodder (140 to 170 tonne/ha/annum) even during frost months. However, prolonged grazing in *Phalaris pastures* can affect the nervous system leading to staggers. Rye grass (*Lolium perenne*) is another frost-resistant perennial grass that can be grown for green fodder and pasture as well. Comfrey, another temperate fodder, with leaves, rich in phosphorus and vitamin B_{12} is very useful in feeding of ruminants.

Legumes: For efficient livestock production, leguminous fodder is very important. White clover (*Trifolium repens*), a legume suitable for pasture has adapted well to the region. *Kikuyu* grass combines very well with white clover, forming a symbiotic association in pasture. white clover fixes atmospheric nitrogen (N) for the soil while the *Kikuyu* grass with strong well spread roots enables better establishment and aeration. From the nutrition point of view, white clover being a legume is high in protein and the *Kikuyu* grass provides sufficient



Kikuyu grass and White clover in pasture



Frost resistant *Phalaris aquatica*



Oats (Kent variety) as irrigated crop



Maize silage prepared in bins

energy, thus balancing the nutrient requirement of grazing animals. Their soil binding ability also helps in preventing soil erosion.

Berseem (*Trifolium alexandrium*), also known as the winter legume, is suitable for cultivation in the Nilgiris. Seeds must be sown immediately after winter so as to enable maximum number of harvests in a year before the onset of ensuing winter. Tree lucerne (*Chamaecytisus palmensis),* a leguminous tree fodder is another important legume for the region. Agricultural land is precious due to the limited availability and terrace farming is common in the hills. Tree lucerne can be planted in the bunds of terraces, where other crops are in cultivation. Both these legumes are rich in protein and can be fed to livestock in recommended quantities. This will lower cost of feeding by reducing the quantity of concentrates fed to animals.

Maku lotus (*Lotus pedunculatis*), a water loving leguminous creeper, has been found to establish well in water logged and swampy areas, which are otherwise wastelands, can be better utilized for fodder production by introducing this legume. The mean yield of fodder was recorded as 2.54 tonne/ha/annum on dry matter basis. Several swamps located in the habitat of Toda buffaloes can be brought under this legume, so that buffaloes can get sufficient protein and minerals while grazing.

Agroforestry models: These can reduce fodder shortage, protect grasses from frost, prevent soil erosion, produce other valuable products like timber, fruits *etc.* and act as shelter for grazing animals during warmer parts of the year. The Nilgiris is known for its horticultural crops like plum, pear and peach. Formation of horti-pasture using these trees along with *kikuyu* as grass component will further enhance biomass production. Similarly, two models of silvipasture using *Acacia melanoxylan* and tree lucerne trees with *kikuyu* grass were identified as better models. Tree lucerne can be cultivated as a hedge around other cultivable lands also. Other operations such as bush clearing, rotational grazing, irrigation, manuring and reseeding will further improve the efficiency of pastures. *Acacia melanoxylan* and *Acacia dealbetta* are important tree fodders that come to the rescue of farmers during frost months. However, the high tannin content in the leaves limits their continuous use as fodder.

Crop residues: Carrot whole top is another crop residue extensively used as fodder in the district. The ability of carrot plant to withstand frost under irrigated conditions has made them suitable for cultivation as a horticultural crop throughout the year including winter. The whole carrot top, after harvest of carrots, is available in plenty at no cost as a palatable and nutritious green fodder. The carrot leaves rich in protein can also be preserved in the form of blocks for later use. Other crop residues available in lesser quantities, but can also be used as fodder, are cabbage, cauliflower and beetroot leaves and haulms of bean and peas.

Preservation of fodder: Frost resistant varieties of fodder can meet the fodder requirement for months of scarcity only to an extent, as the yield of fodder during winter will be low and the area with irrigation facilities



Planting of Maku lotus in swamps

are limited. Hence, fodder when available in abundance during rainy months, needs to be conserved for lean periods. Conservation in the form of silage is the only way to conserve fodder as the climatic conditions does not allow hay making in this region. Fodder maize is the most suitable crop for silage preparation as it requires lesser quantity of substrates like jaggery and molasses, by virtue of its high soluble carbohydrate content. Other grasses like *Phalaris* grass, *rye* grass, oats, *kikuyu* grass etc., when available can also be preserved as silage. Farmers with small dairy units can even prepare silage in polythene bags or bins according to their need.

SUMMARY

Grasslands are not only an important source of fodder, but also very essential for their role in the ecosystem. The existing grasslands have to be conserved. Fodder management in hilly regions must be aimed at a continuous supply of green fodder throughout the year, for which there are plenty of options available.

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Krishi Unnati Yojana

The *Krishi Unnati Yojana,* a central sector scheme, is envisaged as umbrella programme for focusing on food security, by merging schemes on Soil-health Card, Integrated Scheme on Agricultural Co-operation and Agricultural Marketing, National Mission on Agriculture Extension, Horticulture Development, Price Stabilization Fund, National Mission on Sustainable Agriculture and other programmes.