

## Introduction

In geographical terms, the tropics are the region between the Tropics of Cancer (23.5° latitude) and Capricorn (23.5°S latitude). Humid tropics are a climatic region of high rainfall in the tropics where mean monthly temperatures are always high, and exceed 18°C throughout the year; and where rainfall exceeds evapotranspiration for at least 270 days in a year. The humid tropical belt extends from the equator to approximately 20° latitude both north and south. This climatic region occupies a vast region of the world and contains parts of as many as 60 countries which are partly or completely located within this region. On a worldwide scale, this region occupies about 36 per cent of the earth's surface. About 45 per cent of the humid tropical area is in the American continent; Africa accounts for about 30 per cent and Asia 25 per cent with only a small fraction in the Oceania and Pacific islands. It is estimated that as much as 33 per cent of the world population, or about two billion people are living in the humid tropics.

Tropical region is rich in bio-diversity. Different vegetation types are seen in the tropics with numerous tree species of varying height and canopy structure. The tropical rain forest, the most predominant vegetation of the humid tropics is diverse and complex. This climax vegetation occupies about 10 per cent of the world's land area. Several forage species are endemic to the Western Ghats. However, they were not fully explored and utilized properly. In fact, most of the forage grasses, which we grow, were introduced from other parts of the tropics. Exotic pasture species were introduced mainly to overcome a deficiency in our native flora in terms of nutritive value or overall productivity. Introduced species are used to establish sown pastures or simply to maintain the crop under cut-and carry system. These are also used to improve the productivity of natural pasturelands, either through additions or replacement of existing species. A large number of forage species were introduced from Tropical America, Tropical Africa and Southeast Asia to Kerala and similar tropical regions in India and are growing well. As successful animal husbandry is dependant on the availability of cheap sources of good quality feeds, various options for increasing the supply of green forages must be explored.

### 1.1. IMPORTANT TERMS

Some important terms, most often used in connection with the study of forage crops, are given below along with their definitions. This is not an exhaustive list of terminology. Other terms of specific importance will be introduced in the text as and when they are discussed.

**Agrostology** : (Agrostology is a specialized discipline of agronomy for the study of forage crops, their management and utilization.)

**Browse** : (Browse is defined as the leaves, tender shoots, twigs and sprouts of woody plants, which are eaten to a varying extent by domestic and wild animals. It also includes fruits, pods and seeds.)

**Crude fibre** : (Crude fibre refers to that portion of a feed insoluble in hot diluted sulphuric acid and diluted sodium hydroxide solution.)

**Crude Protein** : (Crude protein gives an approximate value of the protein content in the forages. It is obtained by multiplying the nitrogen percentage in the feed obtained by Kjeldahl analysis with the factor 6.25.)

**Fodder** : (Fodder is defined as any plant that is cut before being fed to animals in the green state (soilage) or after converting to hay or silage such as Guinea grass, Para grass and Fodder maize.)



**Forage** : The term forage is used broadly to mean all the plant materials that are eaten by herbivorous animals. It includes fodder crops, pastures, crop residues such as straw, stover, husk, pineapple wastes, cocoa rinds and banana leaves, and foliage of certain trees and shrubs. National Academy of Sciences (1971) defines forage as any aerial plant material primarily grasses and legumes, containing more than 18 per cent crude fibre on a dry matter basis.

**Forb** : A general term for an herb other than grass. Forbs include ground legumes and other non-grassy herbs.

**Grass** : A term for the members of the grass family, Gramineae (Poaceae). Sometimes, the term is used in a general sense to include ground legumes and other forbs.

**Grassland** : Grassland is an open tract of land having a plant community of natural herbaceous species, in which the dominant species are perennial grasses, with a few or no wood growth. Woody growth, if present, is widely scattered usually confined to certain isolated clumps. Simply speaking, grassland is a landscape dominated by natural grasses.

**Grazing** : When animals eat or partially defoliate any kind of standing vegetation such as pasture or grassland, it is called grazing.

**Hay** : Hay is an animal feed produced by dehydrating green fodder to a moisture content of about 15 per cent or less so that the biological processes do not proceed rapidly enough to build up heat.

**Haylage** : Haylage, also called *low moisture silage*, *hay crop silage* or *drylage*, is a combination of hay and silage in which the moisture in the grass is reduced to 40-60 per cent by cutting and wilting in the field before it is chopped and ensiled in a silo.

**Herbage** : Herbage is a collective term for the above ground succulent biomass of forage crops fed to livestock.

**Lawn** : Lawn is a ground that is covered with grass and is kept mowed. A lawn has nothing to do with livestock production but maintained for sports and games or for aesthetic purposes.

**Legume** : A general term for a member of the plant family Leguminosae (Fabaceae), which form nitrogen fixing nodules on its roots.

**Ley** : A field temporarily sown to grass species and ploughed after 1-3 years; a temporary pasture.

**Ley farming** : Ley farming is a rotation of arable crops requiring annual cultivation, and leys occupying the field for two years or longer.

**Meadow** : An area covered with grasses or succulent fodder legumes grown primarily for hay or silage rather than for grazing.

**Overseeding** : It refers to seeding of a grass or legume into an existing grassland to improve and maintain the productivity and quality of herbage.

**Paddock** : An enclosed field under pasture; originally near a house, or stable but now any enclosed area with pasture.

**Pasture** : Pasture is a community of grasses with or without non-grass vegetation maintained for grazing purposes. Both natural and sown pastures are included.

**Range** : A natural grassland in which the climax vegetation or the potential plant community consists principally of native grasses, forbs (broadleaf herbs) and shrubs that are valuable as forage and are in sufficient quantity to justify its use for grazing.

**Roughage** : Roughages are bulky feed stuffs for livestock that are relatively high in crude fibre and low in digestible nutrients. They may be green or dry and contain more than 18 per cent crude fibre.



**Silage :** Silage is an animal feed obtained by packing fresh fodder in a suitable container and allowing it to ferment under anaerobic conditions, without undergoing much loss of nutrients.

**Sod :** The grass and forb covered top surface of the ground.

**Soilage :** Soilage is a general term to indicate fodder cut green and fed in fresh condition.

**Stover :** Stover is a term for cereal stubble and broken pieces of straw from threshing.

**Straw :** The dried stalks of cereals after threshing and removing the seeds is called straw. Sometimes, the term is applied to the haulm of peas and beans as well.

**Sward :** Sward is a portion of the ground covered with grass.

**Turf :** Turf is the upper stratum of soil bound with the roots and stems of low growing grasses and forbs into a thick mat.

**Volunteer :** Plant species, which germinates or regenerates in an area without being sown.

## 1.2. PROBLEMS AND PROSPECTS OF FORAGE CULTIVATION IN INDIA

The problem of feeding animals with green forages is acute in India. Although livestock rearing is an important subsidiary activity in almost all rural households, and form an integral part of homestead based farming system, fodder cultivation did not receive the importance it deserves. The main reasons can be listed as follows.

- Non-availability of suitable land for growing forage crops.
- Lack of sufficient irrigation facilities.
- Non-availability of suitable good quality seeds and other planting materials of forage crops.
- High cost of cultivation and lack of processing facilities.
- Poor dissemination of knowledge in various aspects of forage production.



FIG. 1.1. Collection of native grasses. A major source of feed in the villages.