

## LECTURE- 4

### LEARNING OBJECTIVE: DIFFERENT AGROFORESTRY SYSTEMS, SUBSYSTEM, PRACTICES, AFS CLASSIFICATION, AFS ON NATURE AND ARRANGEMENT OF COMPONENTS (CONTD...)

#### II. SILVI-PASTORAL SYSTEM (TREES + PASTURE and/or ANIMALS)

- The production of woody plants combined with pasture is referred to as a silvi-pastoral system.
- The trees and shrubs may be used primarily to produce fodder for livestock or they may be grown for timber, fuelwood, and fruit or to improve the soil.
- A silvi-pastoral system is needed in dry areas, in order to meet out the demands of wood and fodder throughout the year. There are three main categories of silvicultural system

##### A. Protein bank

##### B. Live fence of fodder trees and hedges

##### C. Trees and shrubs on pasture land

#### A. PROTEIN BANK:

- In this system various multipurpose trees (protein rich trees) are planted on or around farmlands and rangelands
- For cut and carry fodder production to meet the fodder requirements of livestock during the fodder deficit period in winter.
- These trees are rich in protein.
- The trees planted in protein banks are...

*Grewia optiva, Bauhinia variegata, Morus alba, Artocarpus spp., Anogeissus latifolia, Cordia dichotoma, Dalbergia sissoo, Eutralobium saman, Zizyphus jujube, etc.*

#### B. LIVE FENCE OF FODDER TREES AND HEDGES:

- In this system, various fodder trees and shrubs are planted as live fences to protect the property from stray animals
- To protect the farm property from biotic influences.

- The following trees are generally used: *Sesbania grandiflora*, *Gliricidia sepium*, *Erythrina abyssinica*, *Euphorbia* spp., *Acacia* spp. etc.

### **C. TREES AND SHRUBS ON PASTURE LAND:**

- In this system various tree and shrub species are scattered irregularly or arranged according to some systematic pattern,

## **III. AGRISILVOPASTORAL/AGROSILVOPASTORAL SYSTEM (CROPS + TREE + GRASSES/ANIMALS)**

This system has been grouped into two subgroups:

### **A. HOME GARDENS**

### **B. WOODY HEDGE ROWS FOR BROWSING, MULCHING, GREEN MANURING AND SOIL CONSERVATION.**

#### **A. HOME GARDENS:**

- It is deliberate integration of trees, crop and animals in a same unit of land in some form of spatial and temporal sequence.
- This is one of the oldest agroforestry practices found in high rainfall area of South and South-East Asia.
- In India it is prevalent in Southern states like Kerala, Tamilnadu.
- Also common in North Eastern states like Tripura, Assom, West Bengal and part of Islands of Andaman and Nicobar.
- In India it is a common practice to plant trees around the habitation.
- It is also known as multilayered AFS
- Area of homestead varies from 0.2-0.5ha
- Tall tree/timber tree occupy the top most layer followed by fruit tree.
- Small shrubs also form the parts of home garden.
- Shade loving vegetables find their place in the ground layer.
- Trees provide timber, fruits and also support climber such as pepper, cucurbits, clove, yam, sweet potato, colocasia etc.
- Pineapple is a common fruit grown in home garden.

- In hills, the common spp. for home gardens is *Grewia optiva*, *Ficus glomerata*, *Juglans regia* and *Punica granatum*.
- In rural areas, fruit trees and commercial tree spp., such as *Acacia* and *Neem* are of common occurrence in most of the country.
- Cattle and poultry are the main component of homesteads.
- Forage spp. like *Stylo*, *Guinea grass*, *Guatemala*, *Napier* and *Setaria cephalis* variety *Kazungula* also find their place in home garden.

#### **B. WOODY HEDGES FOR BROWSING, GREEN MANURING, MULCHING AND SOIL CONSERVATION:**

- In this system various woody hedges especially
- Fast growing
- Good coppicing capacity planted in order to
- Browse the animals
- Mulching purpose
- Green manuring purpose
- Soil conservation purpose
- Aim is production of food, fodder, fuel-wood and soil conservation

#### **IV. OTHER SPECIFIED SYSTEMS**

##### **i) Apiculture with Tree:**

- In this system nectar and pollen rich tree/shrubs are planted on the bunds of the farm.
- Some agriculture/oil seed crops are also grown.
- *Mangifera indica*, *Vitex negundo*, *Melia azedarach*, *Azadirachta indica*, *Prunus salicina*, *Prunus armeniaca*, *Rubus ellipticus*, *Eucalyptus spp.*, *Callistemon lanceolatus*, *Berberis lycium*, *Toona ciliata*, etc.
- Main purpose of this system is production of honey.

##### **ii) Aqua-forestry:**

- ✓ Aqua-forestry is very common in coastal regions (more evident along Andhra coast).
- ✓ Farmers are cultivating fish and prawn in saline water and growing coconut and other trees on bunds of ponds.
- ✓ These trees help in producing litter-feed to fishery and generate extra income to farmers.
- ✓ Now fish culture in mangroves is also advocated which forms a rich source of nutrition to aquatic life and breeding ground for juvenile fish, prawn and mussels.
- ✓ A well-balanced system of animal husbandry including goatry, poultry, duck-farming, turtles and fishes in the small ponds in home-gardens make a balanced system of high moisture, energy and nutrient-use efficiency per unit area.
- ✓ The leaves of many leguminous trees viz. *Gliricidia sepium*, *Leucaena*, *Moringa oleifera*, *Acacia nilotica* etc. have been found to serve as good fish feed when offered as pellets and improved its productivity.
- ✓ Area is enclosed with earth embakements.
- ✓ Inside the embakement, system of ridges and canals is created. Rain water is collected by making bunds which helps in growing of tree species.

### iii) **Multipurpose Wood Lots:**

In this system special location-specific MPTs are grown mixed or separately planted for various purposes such as wood, fodder, soil protection, soil reclamation, etc.

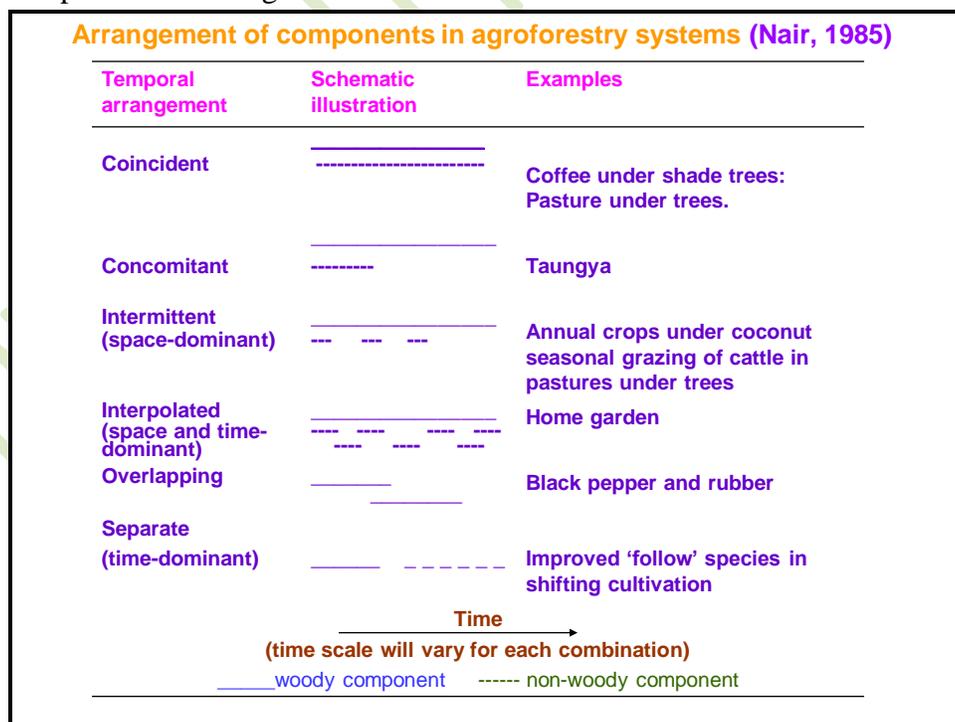
## B) **AGROFORESTRY SYSTEMS BASED ARRANGEMENT OF COMPONENTS**

Arrangement of component refers to the plant component of the system even in agroforestry system involving animal the management of such animal according to definite plan such as rotational grazing scheme is in consideration more of the plant than animal. Such plant arrangement in multi species combination can involve dimension, space and time.

- **Spatial arrangement of plant in agroforestry mixture can result**
  - Mixed dense, e.g., homegardens
  - Mixed sparse, e.g. most systems of trees in pastures
  - Zonal-microzonal, macrozonal

Spatial or zonal agroforestry varies from microzonal (such as alternate rows of plant components) to macrozonal arrangements. An extreme form of the zonal arrangement is the boundary planting of trees on edges of plots for fruits, fodder, fuel wood, fencing, soil protection and windbreak.

- **Temporal arrangement of plant in agroforestry systems can take various forms such as**
  - **Coincident**  
When two component woody and non woody components occupy the land together as coffee under shade tree and pasture under shade trees
  - **Concomitant**  
When two component woody or non woody stays together for some part of life as in taungya
  - **Intermittent (Space dominated)**  
When annual crops are grown with perennial crops such as paddy with coconut
  - **Interpolated (Space and time dominated)**  
When different components occupy space during different time as in home garden
  - **Overlapping** Black and rubber
  - **Separate (time dominated)**  
When component occupy space during separate time such as improved fallow species in shifting cultivation



**Plate 4.1** Arrangement of components in agroforestry systems

- **Functional basis:** refers to the major function or role of the system, usually furnished by the woody components (these can be of a service or protective nature, e.g., windbreak, shelterbelt, soil conservation).
  - Production
  - Protection
- **Socioeconomic basis:** refers to the level of inputs of management (low input, high input) or intensity or scale of management and commercial goals (subsistence, commercial, intermediate).
  - **Commercial agroforestry systems** aim at the production of a saleable output (for example, commercial tree plantations with under planting of food crops)
  - **Intermediate agroforestry systems** fall between commercial and subsistence scales of production and management
  - **Subsistence agroforestry systems** are directed toward satisfying basic needs, and are managed mostly by the owner/occupant and his family. Cash crops, including sale of produce surplus are only supplementary
- **Ecological basis:** refers to the environmental condition and ecological suitability of systems, based on the assumption that certain types of systems can be more appropriate for certain ecological conditions; i.e., there can be separate sets of agroforestry systems for arid and semiarid lands, tropical highlands, lowland humid tropics, etc.