Biodiversity

"Variety, variability & processes in which they occur"

Levels of biodiversity

Genetic diversity	Diversity of genes within a species. There is a genetic variability among the populations and the individuals of the same species
Species diversity	Diversity among species in an ecosystem
Ecosystem diversity	Diversity at a higher level of organization, the ecosystem level

Values of Biodiversity

1. Direct

2. Indirect

3. Aesthetic values

4. Ethical values

Biodiversity Status.....

Context IHR

Group	Total Species	% Endemism
Angiosperms	8000	40
Gymnosperms	44	16
Pteridophytes	600	25
Bryophytes	1737	32.5
Lichens	1159	11.2
Fungi	6900	27.4
Fishes	218	25.7
Amphibians	74	47.3
Reptiles	149	19.5
Birds	528	-
Mammals	241	-

Source: Singh & Hajra, 1996; Ghosh, 1997

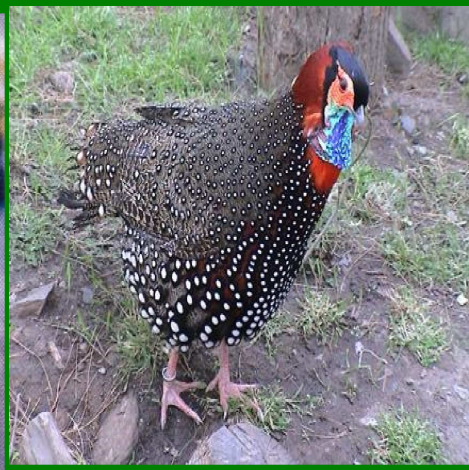
Global Biodiversity: Flora

Taxonomic Group	Species	
	India	World
Bacteria	850	4,000
Viruses	Unknown	4,000
Algae	6,500	40,000
Fungi	14,500	72,000
Bryophytes	2,850	16,000
Pteridophytes	1,100	13,000
Gymnosperms	64	750
Angiosperms	17,500	2,50,000

Global Biodiversity: Fauna

Taxonomic Group	Species	
	India	World
Protista	2,577	31,259
Mollusca	5,070	66,535
Arthropoda	68,389	9,87,949
Other Invertebrates	8,329	87,121
Protochordata	119	2,106
Pisces	2,546	21,723
Amphibia	209	5,150
Reptilia	456	5,817
Aves	1,232	9,026
Mamalia	390	4,629

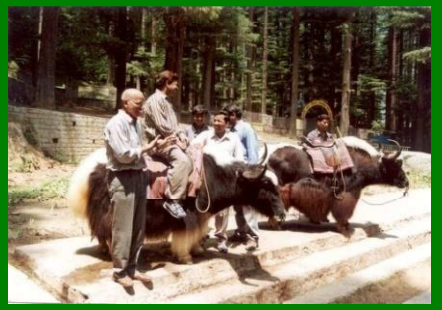
Unique Fauna



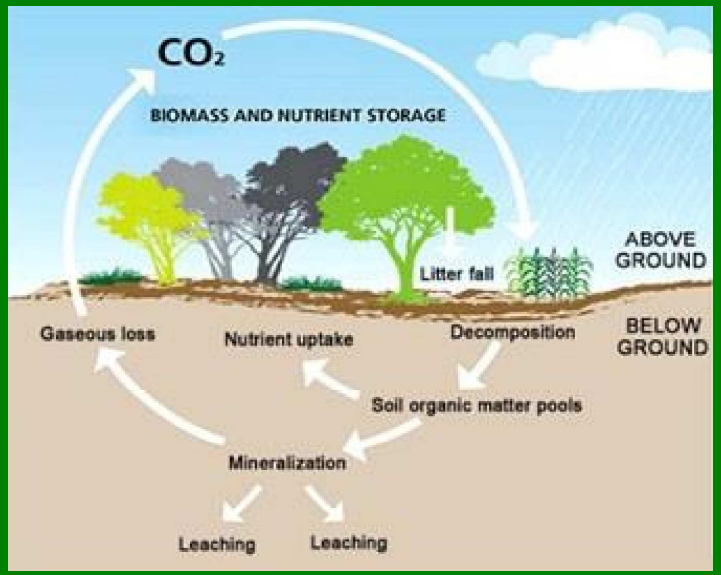
Ecosystem Services

Provisioning : Medicinal Plants, Wild Edibles, Fodder, Fuel, Timber, etc.

Recreational: Tourism, Cultural

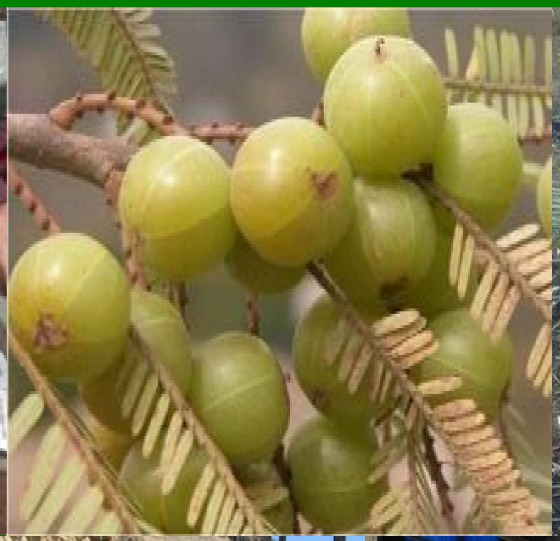


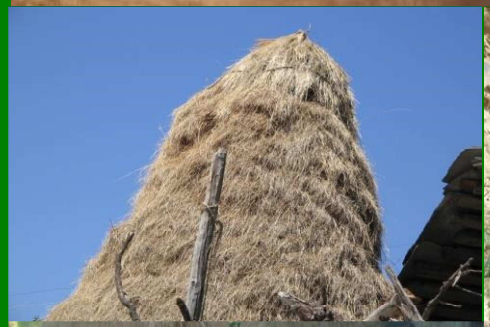
Regulating: Carbon Sequestration



Supporting: Biodiversity, Pollination

Ecosystem Services






Ecosystem Services












Bamboo Products

Processing of Seabuckthorn Fruits

Seabuckthorn Products

Properties of products

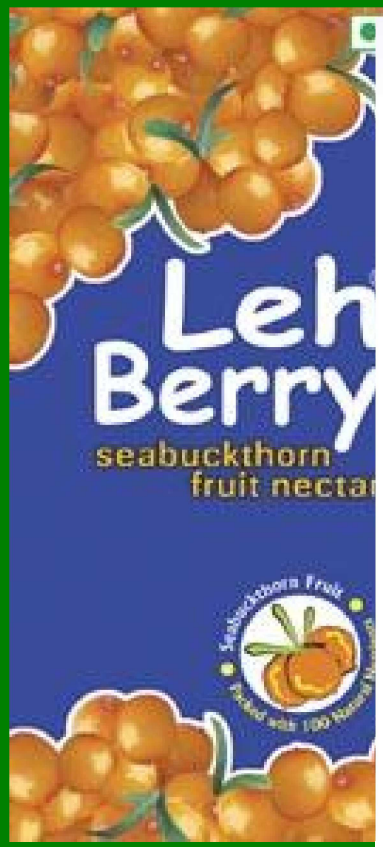
- Anti-inflammatory
- Antimicrobial activity
- Anti-oxidant activity
- Role in age related memory disorder
- Immunomodulatory
- Anti-tumor genesis
- Tissue regeneration

Poultry feed

Biscuits

Tea

Juice

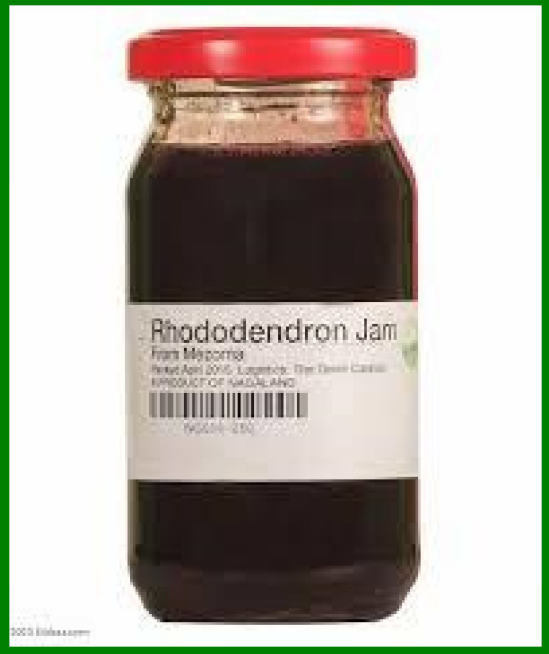


Leh Berry Juice

Sauce

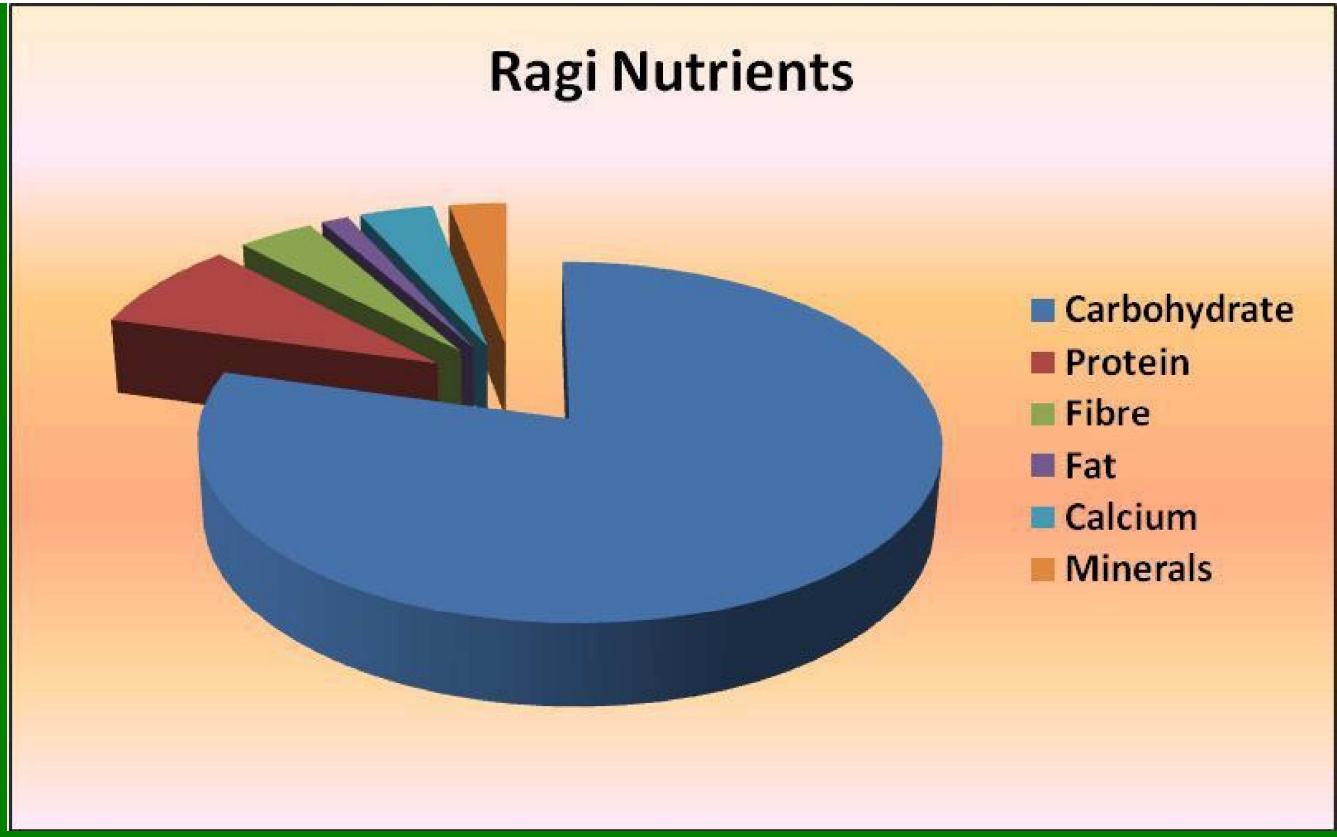
Wines

RHODODENDRON



Finger Millet

Major portion of Finger Millet Flour is carbohydrate, around 80%. The Fat percentage is quite less which is good. Protein and fiber contents vary but range from less to moderate. 100 grams of Finger Millet has roughly on an average of 336 KCal of energy in them.



Red Rice & Kidney Beans of Himalaya

(Rich source of antioxidants)

Red Rice

- Manganese—Energy Production Plus Antioxidant Protection
- Rich in Fiber and Selenium, Lower Cholesterol, Significant Cardiovascular Benefits for Postmenopausal Women
- Phytonutrients with Health-Promoting Activity Equal to or Even Higher than that of Vegetables and Fruits

Buckwheat

- Energizing and nutritious can be served as an alternative to rice or made into porridge.
- Buckwheat is actually a fruit seed that is related to rhubarb and sorrel making it a suitable substitute for grains for people who are sensitive to wheat or other.
- Buckwheat flowers are very fragrant and are attractive to bees that use them to produce a special, strongly flavored, dark honey.

Aloe vera **is said to be one of the best natural sources of health supplements for the human body. The plant is rich in minerals, vitamins and amino acids that benefit the body in numerable ways**

Sida cordifolia, Phaseolus trilobus, Piper longum, Teramnus labrialis, Pistacia integerrima, Dhatri, Phyllanthus urinaria, Vitis vinifera, Leptadenia reticulata, Myrobalan, Terminalia Chebula, Tinospora cordifolia, Habenaria intertnedia, Habenaria acuminata, **White Turmeric,** ***Zedoary, Curcuma zedoaria, Mustak, Cyperus rotundus, Boerhavia diffusa, Polygonatum verticillatum, Polygonnatum cirrifolium, Pterocarpus santalinus, Pueraria tuberosa, Adhatoda vasica, Roscoea apina, Emblica officinalis,*** **Gingelly Oil, Clarified Butter, Raw Sugar,** ***Bambusa arundinacea,Cinnamomum zeylanicum, Elettaria cardamomum***

Products

Minor Forest Products

Minor Forest Products






Minor Forest Products

Ecosystem Services
Pollinators and Pollination– Apple

***Calliphora vicina* Robinean**

Eupeodes frequens Mastmura

Eristalis tabanoides Jaennicke

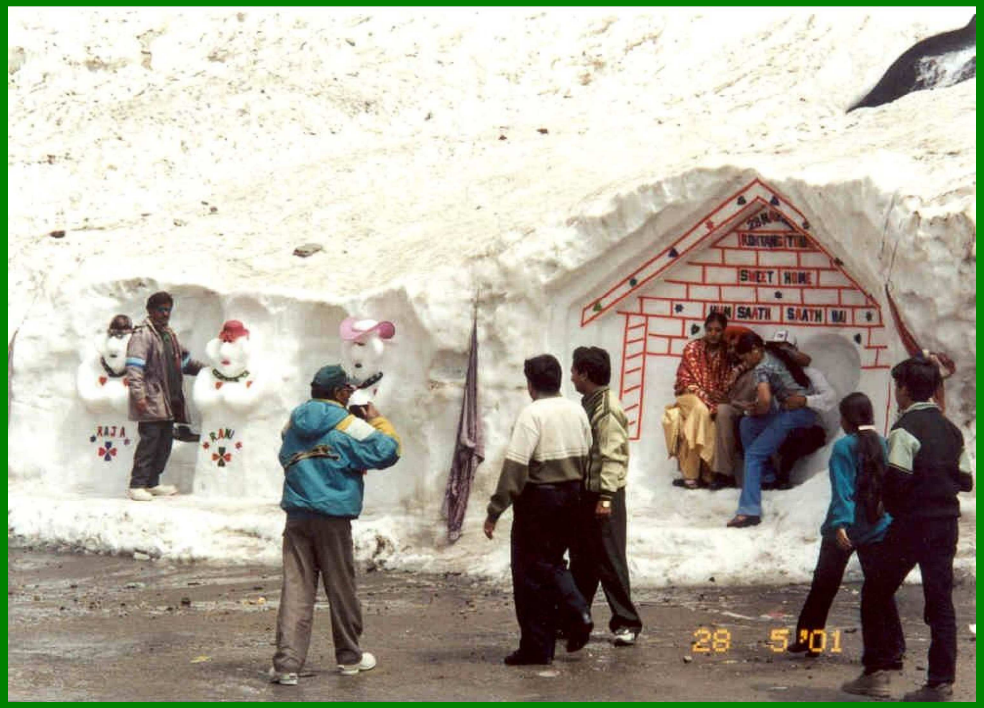
Episyrphus balteatus (de Geer)

Eristalis tenax Linnaeus

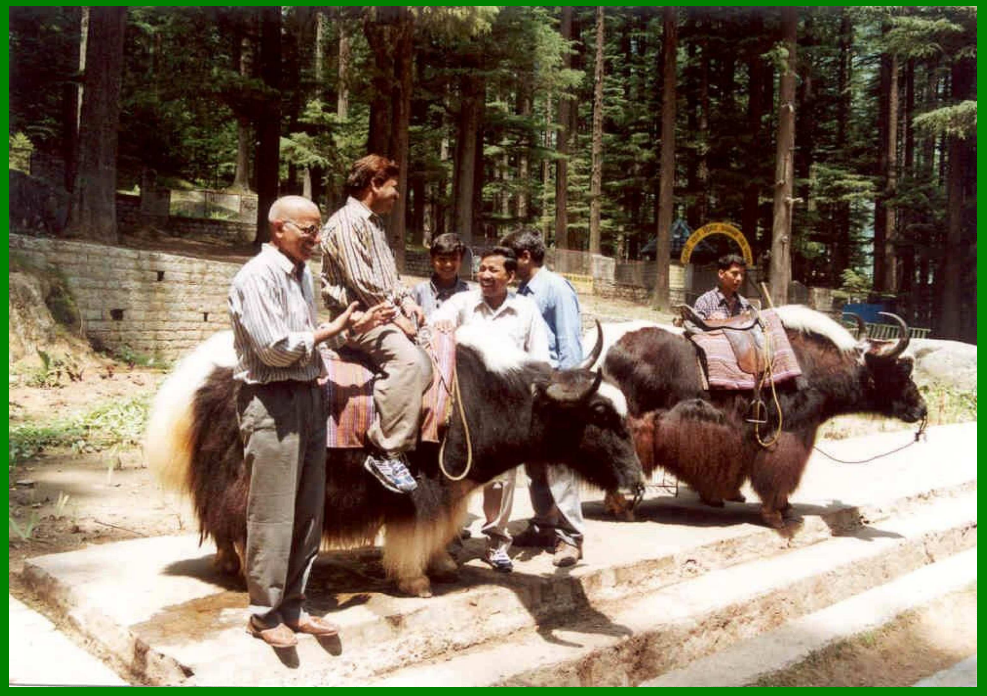
Andrena leaena Caremon

Apis mellifera

Apis cerana



Ecosystem Services: Eco-Tourism



Loss of Biodiversity - Anthropogenic activities

Population explosion

Urbanization

Forest degradation

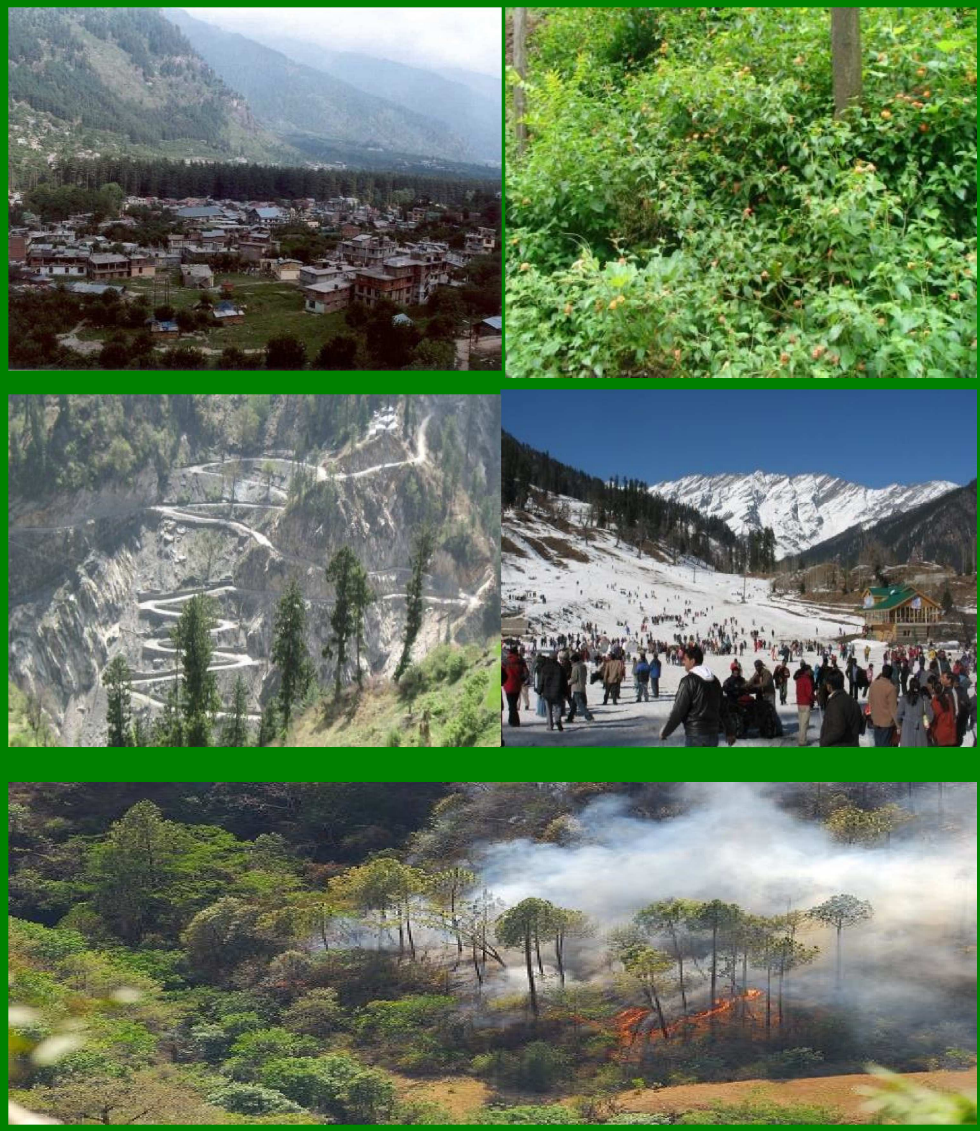
Construction of roads

Industrialization

Construction of HEPs

Forest fire and biomass burning

Tourism beyond carrying capacity



Form of Plants Life

Phanerophytes

Organoleptic Stems

Chamaephytes

Hemicryptophytes

Cryptophytes

Therophytes

Form of Plants Life

Form of Plants Life The Place and Way

- According to Raunkiaer (1934), the range of adaptation of plants relates to the mode of shoot withdrawal in the unfavorable season.
- One of the first to provide a comprehensive system of plant life form classification based on their adaptations for surviving the unfavorable season (winter cold or summer drought).
- Adaptations for survival linked to the protection afforded to the *sensitive apical meristems or* classification of plant life in relation to the HEIGHT of PERENNATING tissue (embryonic or meristemic tissues that *remain inactive over winter* or *prolonged dry periods*) aboveground.
- It can distinguish to, phanerophytes, chamaephytes, hemicryptophytes, cryptophytes and therophytes.

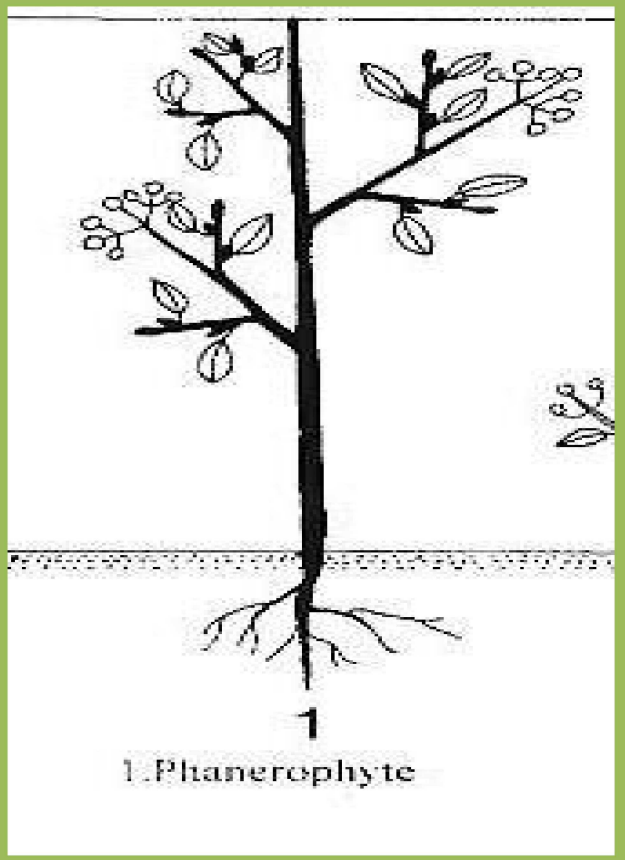
Form of Plants Life

Organoleptic Stems

- Phaneropytes
- Chamaephytes
- Hemicryptophytes
- Cryptophytes
- Therophytes

Phanerophytes (*Phanero* = visible)

Trees and shrubs greater than 25 cm in height that have their leaf-producing buds elevated above ground on stems.



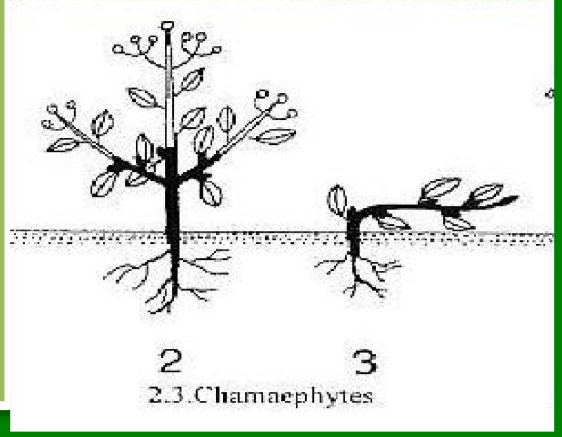
Cont.....

Organoleptic Stems

- Phaneropytes
- **Chamaephytes**
- Hemicryptophytes
- Cryptophytes
- Therophytes

Chamaephytes (*chamae* = dwarf) Perennial shoots or buds are on the surface of the ground to about 25 cm above the surface.

- Subfructicosa chamaephytes, the buds are protected by the ingredients.
- Passive chamaephytes, stem extends above the ground.
- Active chamaephytes, buds above ground.
- Cushion chamaephytes, transition Chamaephytes and Hemicryptophytes.



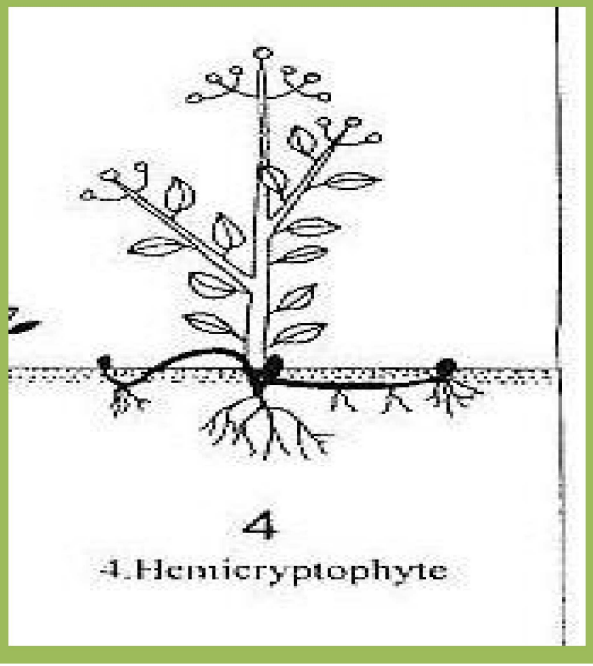
Cont.

Organoleptic Stems

- Phaneropytes
- Chamaephytes
- Hemicryptophytes
- Cryptophytes
- Therophytes

Hemicryptophytes (*hemicrypto* = half hidden)

perennial shoots or buds are close to the surface of the ground, often covered with litter.



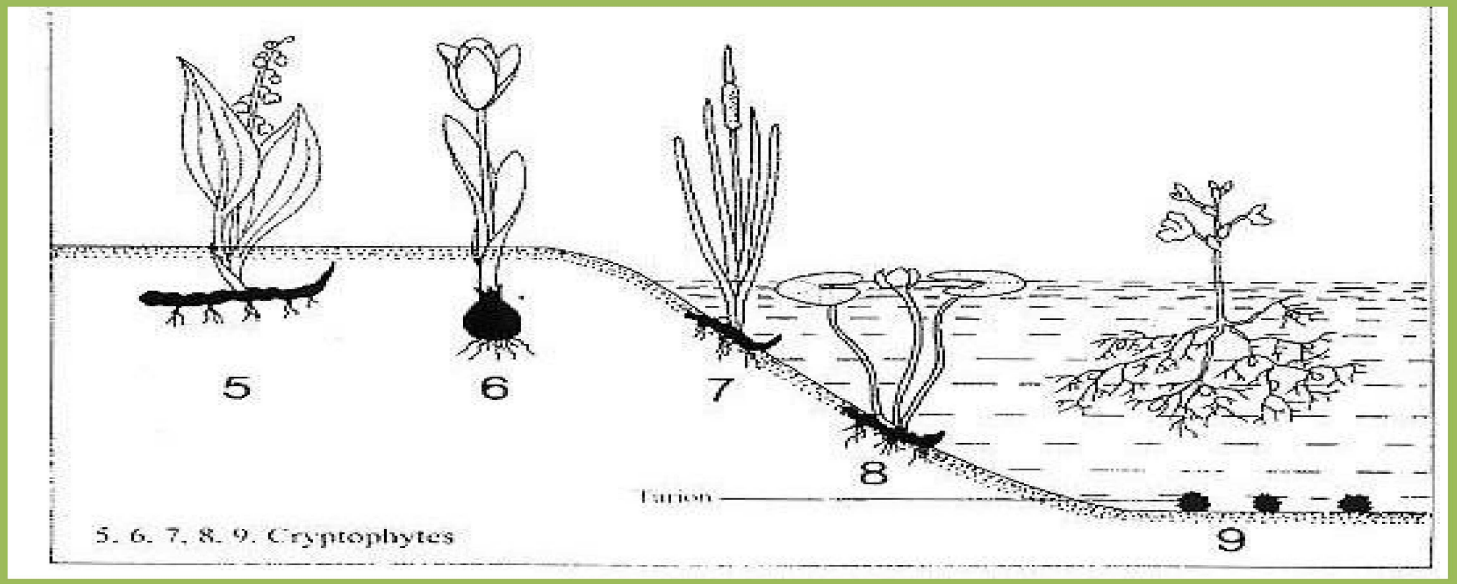
cont.,

Organoleptic Stems

- Phaneropytes
- Chamaephytes
- Hemicryptophytes
- Cryptophytes
- Therophytes

Cryptophytes (*crypto* = hidden)

grasses which have above-ground tissues that die back in winter or during prolonged dry periods and survive unfavourable periods as buds buried in the ground on a bulb or rhizome.



Cont.....

- Phaneropytes
- Chamaephytes
- Hemicryptophytes
- Cryptophytes
- Therophytes

Therophytes (*thero* = summer)
Annuals that survive unfavourable periods as seeds and complete their life cycle from seed to seed in one.

Raunkiaer life form classification system based on location of the perennating bud.

Life form	Location of perennating tissue	Plant types
Phanerophyte	*>0.5 m*	Trees and tall shrubs
Chamaephyte	0 - 0.5 m	Small shrubs and herbs
Hemicryptophyte	Soil surface	Prostrate shrubs or herbaceous plants that dieback each year
Cryptophyte	In the soil	Rhizomatous grasses or bulb forming herbs
Therophyte	Seed	Annuals