INTER SPECIFIC INTER ACTIOINS

Due to increase in different species in community, interaction (for food, habitat) also starts between them.

(a) Positive or beneficial interaction - Member of one or both the interacting species are benefited but neither is harmed.

(b) Negative interaction - One or both interacting species is harmed

POSITIVE OR BENEFICIAL INTERACTIONS

It is a wide spread phenomenon, it includes → mutualism, commensalisms, protocooperation

1. Mutualism (+/+) or Symbiosis : - (**co-evaluation**)

Positive inter specific interaction in which members of two different species completely depends on each other for growth and survival, physical contact is present in between both the interacting species. **it is obligatory relationship.**

- **Mutualism between animal and animal -**
  e.g. Termites and Flagellates (Trichonympha)

- **Mutualism between plant & animals -**
  e.g. (a) Zoochlorella and Hydra
  (b) Yucca plant flowers and Pronuba insect - Pollination of yucca plant by pronuba (Female yucca moth)

- **Mutualism between plant and bacteria -**
  e.g. legume plant and Rhizobium

- **Mutualism between algae and higher plant -**
  e.g. Nostoc, Anabaena and Anthoceros plant

- **Mutualism between algae and fungi -**
  e.g. Lichens

- **Mutualism between fungi and higher plants -**
  e.g. Mycorrhizal association

Note : Extra e.g.

- Fig tree and wasp species.
  In many species of fig trees, there is a tight one to one relationship with the pollinator species of wasp, If means that a given fig species can be pollinated only by its partner wasp species and no other species. The female wasp uses the fruit not only as ovipositor (egg-laying) side but uses the developing seeds with in the fruit for nourishing its larval. The wasp pollinates the fig inflorescence while searching for suitable egg-laying sites. In return for the favour of pollination the fig offers the wasp some of its developing seeds, as food for the developing wasp larvae.
- Bees and orchid flower.

Orchids show diversity of floral patterns, which have evolved to attract the right pollinator insect (bees and bumblebees) and ensure guaranteed pollination by it.
The Mediterranean orchid **Ophrys** employs “sexual deceit” to get pollination done by a spices of bee. One petal of its flower beans resemblance to the female of the been in size, colour and markings. The male bee is attracted to what it perceives as a female , **psudocopulates** with the flower and during that process is dusted with pollen from the flower, it transfers pollen to it and thus, pollinates the flower.

2. Commensalism (+/0)-

Association between members of two species in which one is benefited while other is almost unaffected.

- **Lianas -** are woody plants. Their roots are present in soil but their stem uses other plant or object for support to get better light. They are found in dense forest. No nutritional relationship. Lianas are the speciality of tropical rain forest.
  e.g. *Bauhinia, Tinospora*

- **Epiphytes -** Small plants grow on other plants in tropical rain forest. They utilise only the space of host plant for light & humidity
  e.g. *Orchids, Hanging mosses*

- **Epizones -** Those animals whish depends on plants or other animals.

Sucker fish (Encheneis)	-	Shark
Pilot fish	-	Shark
E.coil bacteria	-	Intestine of man
Clown fish	-	Sea anemone
Barnacles	-	Whale
Cattle egret birds	-	Cattle

3. Proto - cooperation (+/+) - Association in which both organisms are benefited but can live separately, it is a facultative or optional or occasional association also called as **non - obligator** relationship.

e.g.

- Hermit crab - Sea anemone
- Tick bird (Red-billed or yellow billed) - Rhinoceros
- Crocodile - Bird

Scavenging – Association which one partner called scavenger or saprobiont, eats the dead bodies of other animals, which have dies naturally or killed by another animal
e.g. Jackal, Vulture, Ant, Crow

Helotism - Association in between two organisms, when one behaves as a master and another as slave.
e.g. Lichen

NEGATIVE INTERACTIOIN (ANTAGONISM)/DETERMINATION

Two type of negative interaction

(1) Exploitation **(2) Amensalism**

(1) Exploitation - One species harms the other by making its direct or indirect use of support, shelter or food.

It is of two types

(a) Parasitism **(b) Predation**

(a) Parasitism (+/-) → This association involved individuals of two species of different size in which smaller (Parasite) in benefited and larger (host) is harmed. The parasite gets nourishment and shelter from host but does **not kill** the host.

Type of Parasite :

(i) Ectoparasite → lives on the body of host

- **Ectozooparasite -** Leech on cattle, ticks on dogs, copepods on marine fish and lice, mosquitoes, sandfly live on man
- **Ectophytoparasite -** Amphids, Lac insects, Red cotton bug

(ii) Endoparasites → live in the body of host

- Tapeworm, Taenia, Ascaris, Entamoeda → live in intestine of man
- Plasmodium → live in R.B.C. of human

- **Hyper parasitism** → A parasite living on another parasite
  e.g. Plasmodium on female anopheles mosquito, Bateriophages on bacteria.
- **Brood parasitism** → Parasitism in which the parasitic bird (cuckoo) lays its eggs in the nest of its host (crow) and lets the host incubate them this relation is knows as brood parasitism.
- **Holo parasite** → Parasite which are totally dependent upon the host for their requirement
  e.g. *Rafflesia,* (Total root parasite)
  Cascuta (Total stem parasite)
- **Hemiparasite** → Parasite which partially depend on the host.
  e.g. Viscum - on oak
  Loranthus - on mango } both are partial stem parasite,
  Santalum - partial root parasite
  Note : Arceuthobium is the smallest parasite.

(b) Predation (+/-) :- A free living organisms which catches and **kills** another species for food.
Insectivores fungi - Dactylella, Dactylaria, Arhrobotrys
Carnivoroes animals - Lion, snake
Insectivores plants - Drosera, Utricularia, Nepenthes

(2) Amensalism (-/0)-

amensal = (-) inhibitor = (0)

In this interaction one species is inhibited by toxic secretion of another species. Inhibitor species is neitehr benefited nor harmed.

Type of Amensalism

(i) Allelopathy **(ii) Antibiosis**

(i) Antibiosis - Secretion of antibiotics -

- **Penicillium fungi secretes** penicillin which inhibits growth of Staphylococcus bacteria.
- **Chlorella algae secretes** bacteriocytes which not only kill but also inhibit growth of the bacteria.
- **Microsystis (BGA) secretes** hydroxyl amine, this causes the death of fishes.

(ii) Allelopathy - Secretion of toxic chemical-

- **Parthenium -** Transcinnamic acid is secreted by Parthenium which inhibits the growth of some plants like Cassia tora and Vincaregia. This phenomenon is known as allelopathy.
- *Sunflower, Barley, Sorghum, Occium* also show allelopathy.

- **Silver oak shows autophaty -** It destroys own seed.

Allochemics - Chemicals secreted by a species are known as allochemics.

Types of allochemics

- **Allamon -** Chemicals which repel other enemies is called allamon

  e.g. Cattle fish (Sepia)

- **Depressants -** Chemicals which kill or inhibit the growth of other organism

  e.g. Parthenium

- **Kairmons -** The chemicals secreted by one organism which benefits the another organism

  e.g. Nematodes in soil → stimulate growth of fungi.

- **Cannabalism** → organisms eaten by own species

  e.g. cockroach, termites

- **Competition (-, -) :**

  Process in which the fitness of one species is significantly lower in the presence of another species.

RAUNKIAR'S LIFE FORMS

On the basis of position and the degree of protection to perennating organs (bud) during obverse season. Raukiaer divided the plant in to five life forms (growth process)

1. **Phanerophytes** - The buds are located must above the surface of the earth. Such type of plants are found m ore in tropics, epiphytes are included in phanerophytes.
2. **Chamaeophaytes** - The buds are situated very close / near to the ground surface. Such type of plants are found in cold places or high altitudes.
3. **Hemicryptophytes** - The buds present just below or just above the surface of ground. Such plants are found in temperate climate.
4. **Cryptophytes** - The buds lie very deep in the ground.
5. **Therophytes** - Those plants which are passing the unfavorable climate through their seeds.

SOME TERMINOLOGY RELATED TO COMMUNITY

(1) Formation → A well developed plant community in any climate is called formation.
E.g. → Tropical forest

(2) Association → A sub unit of formation. A smaller community of plant formation with its two or more dominant species is knows as association. A formation has many association.

(3) Consociation → Sub unit of association, means a community with a single dominant species.

METHODS OF STUDY OF PLANT COMMUNITES

1. **Direction Method -** This method is used to find out the species and members present in a community and study about them. This method can be used only for small community.

2. **Sampling method -** In this method we study the community in the form of sample. This method is also useful for large community. Samples are taken in the form of quadrants. The quadrates are formed with the help of rope to know the size of a quadrant, sequentially increase the size of quadrates according to increase in number of species, when the no. of the species becomes constant then estimate the number of plants present in the same size of quadrants. Then after that table work is done.

   (i) Frequency $\rightarrow$ No. of (Percentage) of samples on sampling unit in which species is present. It indicates species dispersal.

$$\text{Frequency} = \frac{\text{No. of samples in which specific species present}}{\text{No. of total samples}} \times 100$$

   e.g. The plants of prosopis species were present in 90 samples out of 100 sample,

   than the frequency of prosopis $= \frac{90}{100} \times 100 = 90\%$

(ii) Density - The number of individuals per unit area, it indicates abundance of a species

$$\text{Density} = \frac{\text{Total no. of individuals of the speceis in all samples}}{\text{Total no. of sample taken}}$$

e.g. 10,000 prosopis were present in100 sample then the density of prosopis $= \frac{1000}{100} = 100$

ANALYSIS OF PLANT COMMUNITIES

Analysis of community characters is generally done for :-

♦ Recording variations within and between communities ♦ Naming and classifying communities Community analysis involves measurements of various characters in sample plots or quadrates located
with in the community.

Frequency	**-**	Based on percentage of plots or quadrant in which a species (which is being studied) is present.
Diversity (Density)	**-**	Number of individuals per unit area.
Cover	**-**	Percentage land are occupied by a species - cover is expressed by basal cover (basal caver area occupied by stem bases) or crown cover (crown cover - area covered by canopy).
Biomass	-	Quantity of living materials per unit area.

Various community characters can be categorized as :

(i) Analytic characters -

Characters which are directly observed or measured in sample plots or quadrates.**(ii) Synthetic characters -**

Which are derived from the measurements of analytic characters?