

❖ BIOLOGICAL INTERACTION

Organisms living together in a community influence each other directly or indirectly under natural conditions.

All the vital process of living such as growth, nutrition and reproduction requires such interactions between individuals in the same species (intraspecific) or between species (interspecific).

These inter or intra relationships of individuals in a population or community of an ecosystem is called biological interactions or population interactions.

The interactions between organisms may not be always beneficial to all the interacting counter parts.

Based on whether, the interaction is beneficial to both interacting species or harmful to at least one interaction species, the ecological interactions are classified into **two categories**.

1. POSITIVE INTERCATIONS

2. NEGATIVE INTERACTIONS

1. POSITIVE INTERCATIONS

- ✓ In positive interactions, the interacting population help one another.
- ✓ The positive interaction may be in one way or reciprocal.
- ✓ The benefit may be respect of food, shelter, substratum or transportation.
- ✓ The positive association may be continuous, transitory, obligate or facultative.
- ✓ The two interacting partners may be in close contact in such a way that the tissues intermixed with each other; or they may live within a specific area of the other, or attached to its surface.

A. Mutualism

- ✓ Mutualism, also called as symbiosis, is also a positive type of ecological interaction.
- ✓ Mutualism is a symbiotic association between two organisms in which both the interacting partners are mutually benefited.
- ✓ Mutualism is different proto-corporation in the sense that mutualism is obligatory and none of the partners of mutualism can survive individually.
- ✓ In mutualism, the organisms enter into some sort of physical and physiological exchange.

EXAMPLES OF MUTUALISM

1) Lichens

- Lichens are the symbiotic association between algae and fungi.
- The body of lichen composed of fungal matrix in which the algal cells are embedded.
- The fungi provide protection to algal components and also provide moisture and nutrients to them.
- The algal components in turn will supply carbohydrates for fungus.



2) Symbiotic nitrogen fixation

- Mutualistic interaction can be seen in the symbiotic nitrogen fixation of Rhizobium associated with root nodules of leguminous plants is the best example.
- Similarly, other microorganisms associated with plants such as Alnus, Casuarina, Cycas of Nitrogen fixation are also belonging to mutualism.



3) Mycorrhizae

- They are the symbiotic association between fungi and roots of some trees.
- Fungal components help in the absorption of water and minerals by the plant.
- The plant in supplies food to fungal components.

**B. Commensalism**

- ✓ Commensalism is a positive type of ecological interaction between two species in an ecosystem.
- ✓ In commensalism, the association occurs between member of two different species where one species is benefited the other is neither benefited nor harmed.
- ✓ Here the two populations live together without entering into any kind of physical exchange, and one is benefited without any effect on the other.

EXAMPLES OF COMMENSALISM**1) Climbers and liens**

- Such as Bauhinia, Tinospora, etc. which are roots in the soil but climb over large trees. These climbers use others as support to get enough sunlight, more than that, the supporting plants do not have any positive or negative effect.



2) Epiphytes

They are the plants which grow on the surface of other large plants. They use other plants only as a support and not for water or food supply. They are different from lianas in that they are not rooted in the soil. E.g. Orchids, Mosses, Nephrolepis, Usnea, green algae growing on the surface of snails, microbes such as bacteria and protozoans live within the body cavity of other animals



C. Proto-cooperation

Protocooperation is a type of ecological interaction where both the species involved in the interaction are benefitted, but the interaction is not obligatory for survival.

- ✓ Proto – cooperation is a positive type of population interaction and it is also called as non-obligatory mutualism.
- ✓ Proto-cooperation is a less extreme type of population interaction.

- ✓ In proto-cooperation, two species interact favourably with each other, though both of them are able to survive separately.
- ✓ It is a temporary association where both the interacting partners get benefited.
- ✓ It is different from mutualism in the sense that, the association is not essential for the survival of any of the species.

EXAMPLE FOR PROTO- COOPERATION

Association between hermit crab (*Epicurus prideauxi*) and sea anemone. The sea anemone is carried by the crab to fresh feeding sites and the crab is in turn protected from enemies by sea anemone.



2. NEGATIVE INTERACTIONS

- ✓ In negative interactions, one of the interacting populations is benefited and the other is harmed.
- ✓ In negative interaction one population may eat members of the other population, compete for foods or excrete harmful wastes.
- ✓ Different types of negative population interactions are:

A. Exploitation

In exploitation, one species harms the other by making its direct or indirect use for support, shelter or food. It is of following types:

1) Social parasitism

Social parasitism describes the exploitation of one species by another for various advantages.

It is a kind of parasitism in which the parasite foists the earning of its young into the host.

Social parasitism in various stages of development is found among some higher vertebrates and insects.

EXAMPLE:

There occurs an egg parasitism in two species of birds – old world cuckoos and the brown headed cowbirds of North America, both of which do not build nests of their own, rather they deposit their eggs in nests of other species, abandoning eggs and young to the care of foster parents. *Eudynamys scolopacea*, *corvus splendens*, *corvus macrorhynchos*, etc.



B. Competition

Competition is the association of two or more species; each species is adversely affected by the presence of other species in respect of food, shelter, space, light, etc. competition occurs when individuals attempt to obtain a resource that is adequate to support all the individuals seeking it or even if the resources are adequate individuals harm one another in trying to obtain it. The resources in the environment for which the individuals harm one another in trying to obtain it.

The resources in the environment for which the individuals compete include raw materials for life such as water, light and nutrients, space for occupying and selection of mates for sexual reproduction. The competition in the ecosystem may be of two types:

(i) **Intra – specific competition:** It is the competition occurring between the individuals of the same population (competition within population). It is also called as scramble competition. Intra – specific competition is an important density dependent factor regulating population size.

Intra – specific competition is also responsible for the even distribution of individuals of the species in an ecosystem.

(ii) Inter – specific competition: It is the competition occurring between populations of different species whose requirements are common and inadequate in the ecosystem (competition between population). It is also called as contest or interference competition.

C. Antibiosis

This is complete or partial inhabitation of one organism by another either by secreting some substance or by modifying its immediate environment.

The substance or conditions produced by an organism are generally harmful for the other organism. This phenomenon is very common in micro – organisms which secrete a substance called antibiotic.

Bacteria, actinomycetes and fungi produce a number of antimicrobial substances which are widespread in

nature. Liches as well as large number of higher plants produce substances that inhibit molds and bacteria.

Antagonistic substances are also reported in some algae, as for example in culture of Chlorella, vulgaris some

substance accumulates which inhibits the growth of the diatom, Nitzschia frustulum.

The term antibiosis would also include such phenomenon as hypersensitive reactions that involve the interaction between microorganisms, particularly pathogenic ones, and are harmful to one or both.