

### *Lecture: 3*

## **BIOTIC FACTORS**

- Biotic factor is any living component that affects another organism, including animals that consume the organism, and the living food that the organism consumes.

**Producers:** Autotrophs: e.g. plants; they convert the energy (from the sun, or other sources) into food,

**Consumers:** Heterotrophs: e.g. animals, *insects*; they depend upon producers for food.

**Decomposers.** E.g., fungi and bacteria; they break down chemicals from **producers** and **consumers** into simpler form which can be reused.

- The biotic factors which affect the **insect behavior, growth, dispersal, distribution, and population are**. 1. Food 2. Other organisms

## **FOOD:**

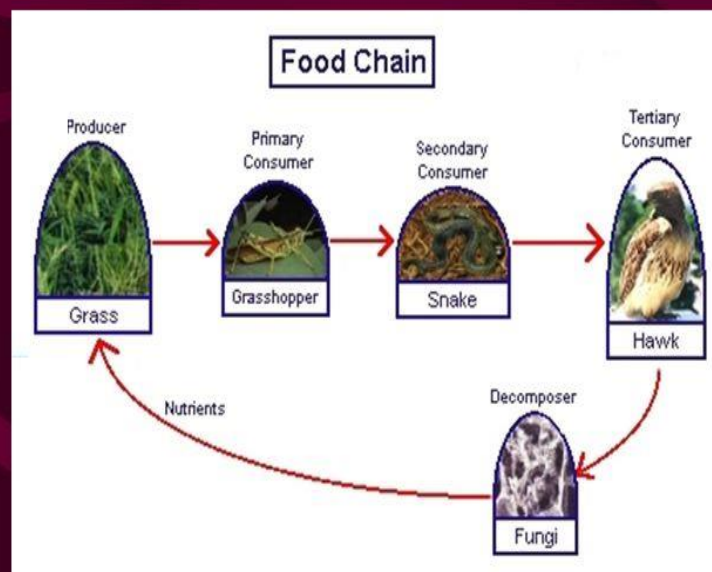
Each insect species has certain natural food requirements for the completion of its life cycle.

Under normal conditions, there is a good adjustment between host and particular species of insects. But in the event of sudden increase in population, the density of population becomes too high to be supported by food availability in the area. **Hence, competition for food as well as space will be there.**

The **quality** and **quantity** of the food influences, **survival, multiplication, growth** and **development** and **longevity** of insect's species.

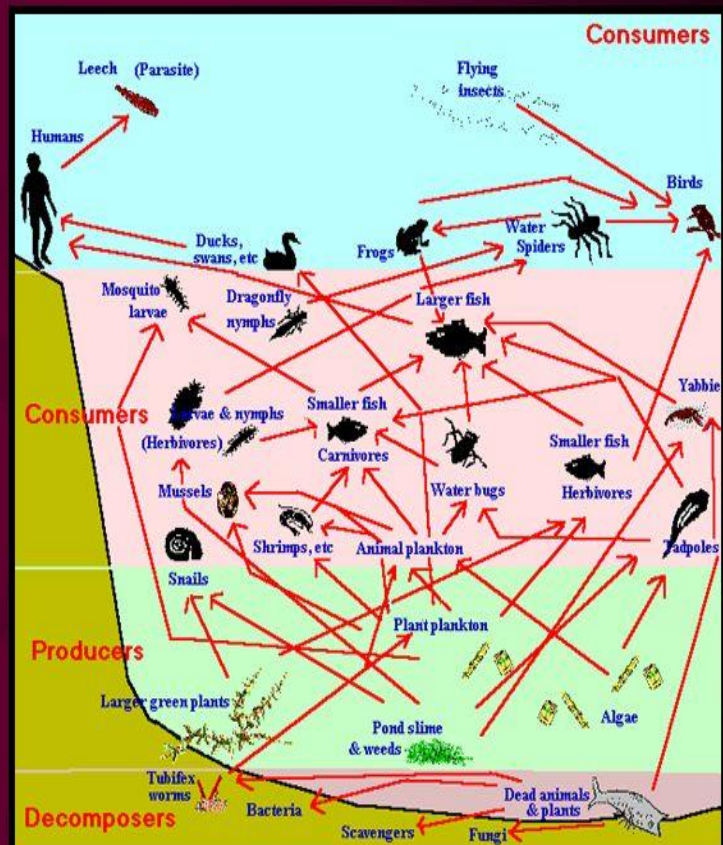
# Food Chain

- A simple show of energy transfer.



# Food Web

- A complex show of energy transfer.
- (most organisms feed at more than one trophic level!)



## *Classification of insects based on food requirements:*

(Omnivorous, Herbivorous, Oligophorus, Monophagus, Polyphagus Carnivorous, Scavengers, and Saprophagus).

**Omnivorous insects** Feed on both plants and animals. E.g., Wasps & Cockroaches.

**Carnivorous insects** Feed on other animals, as parasites and predators  
 Predatory Lady bird beetles, Mantids, *Trichogramma* spp. *Bracon* spp.

**Herbivores insects** Feed on living plants Crop Insect Pests.

**Polyphagous** Feed on wide range of cultivated and wild plants Locusts, Grasshoppers, Cutworms (*Spodoptera litura*).

**Oligophagous** Feed on plants belong to one family, Cabbage butterfly *Pieris brassicae*, Diamond backed moth, *Plutella xylostella*

**Monophagous** Feed on a single species of Plants Paddy stem borer *Scirpophaga incertulas*.

**Saprophytic insects** Feed on decaying plants Fruit fly *Drosophila*, and Cecidomyiid flies.

**Scavengers** Feed on dead organic matter House flies, Scarabaid beetles.

### **Relations between the insects depended on species**

- 1- **Intra-specific relations** (Associations of individuals of the same species).
- 2- **Inter-specific relations** (Associations of individuals of different species).

### **Types of relationships between insects**

#### **A- Harmful Relationship: (Parasites, Predators).**

##### **1- Parasites:**

- Parasite is one, which attaches itself to the body of the other organism, either externally or internally, and gets nourishment and shelter, at least for shorter duration or for entire life- cycle.
- The organism which is attacked by the parasites is called host.

***Parasites can be grouped based on Site of Parasitisation/attack***

##### ***Ectoparasites***

This attacks its host from outside of the body of the host. The mother parasite lays its eggs on the body of the host and after the eggs are hatched, the larvae feed on the host by remaining outside only.

Head louse: *Epiricania melanolenca*.

### ***Endoparasites***

This enters the body of the host and feeds from inside. The mother parasite either lays its eggs inside the tissue of the host or on the food materials of the host to again entry inside.

Braconoids & Ichneumonoids *Apanteles flavipes* on jowar stem borer.

### ***Stage of the Host***

*Egg parasite* Attacks egg stage of the host *Trichogramma spp.*

*Early larval parasite* Attacks early larval stage *Apanteles spp.*

*Mid larval parasite* Attacks mid larval stage *Bracon hebetor*

*Late larval parasite* Attacks late larval stage *Gonozus nephantidis*

*Pre-pupal parasite* Attacks pre-pupal stage *Elasmus nephantidis*

*Pupal parasite* Attacks pupal stage *Stomatocerus spp.*

### ***Duration of the attack***

#### ***Transitory Parasite***

It is not a permanent parasite (completing all stages of its life cycle on the same host), but transitory which spends few stages of its life cycle in one host and other stages on some other species of hosts, or as free living organism , Braconoids and Ichneumonoids

#### ***Permanent Parasite***

Which spends all the stages of its life cycles on the same host Head louse.

### ***Degree of parasitisation***

#### ***Obligatory Parasite***

Parasite which can live only as a parasite and cannot live away from the host even for short period Bird lice and head louse.

#### ***Facultative Parasite***

Parasite, which can live away from the host at least for shorter period Fleas.

*Bracon spp. Apanteles Spp.* on lepidopteran caterpillars.

- 2- Predator: Is an organism(insect) that attack another insect and kiled it directly, e.g., Coccinellids prey aphids.

## **B- Beneficial relationship**

**Symbiosis:** Inter-relations between organisms of different species which live in close and long-term union without harmful effects in known as symbiosis, and each member is known as *symbiont*. One insect feeds on the food collected by another insect of the same species eg: white ants, wasps, bees etc.

**Commensalism:** One insect is benefitted by living on or inside of another insect without injuring the other is known as commensalism, and it usually uses lives on the waste or surplus food of its host. The benefitting insect is called *commensal* while the other one is called host.eg. Gall-forming insect.

**Mutualism:** When the association benefits both the symbionts, it is known as mutualism. Eg: Ants and Aphids, Termites and flagellate protozoans in their guts, Crow on cattle to pick up ticks and mites.