

6. Principles of Ecology

Learning Objectives

The learner will be able to

- ❖ Understand the interaction between organisms and their environment.
- ❖ Describe biotic and abiotic factors that influence the dynamics of populations.
- ❖ Describe how organisms adapt themselves to environmental changes.
- ❖ Learn the structure of various fruits and seeds related to their dispersal mechanism.

Key Points and Notes

- ❖ The term “ecology” (**oekologie**) is derived from two Greek words – **oikos** (meaning house or dwelling place and **logos** meaning study) It was first proposed by **Reiter** (1868). However, the most widely accepted definition of ecology was given by **Ernest Haeckel** (1869).
- ❖ The study of living organisms, both plants and animals, in their natural habitats or homes.
- ❖ Ecology is the study of the reciprocal relationship between living organisms and their environment.
- ❖ Application of the Science of ecology is otherwise called as **Applied ecology** or **Environmental technology**. It helps us to manage and

conserve natural resources, particularly ecosystems, forest and wild life conservative and management.

- ❖ Environmental management involves **Bio-diversity** conservation, **Ecosystem** restoration, **Habitat** management, **Invasive species** management, **Protected areas** management and also help us plan landscapes and environmental impact designing for the futuristic ecology.
- ❖ Taxonomically different species occupying similar habitats (Niches) in different geographical regions are called **Ecological equivalents**.
- ❖ Flowers of poppy, chicory, dog rose and many other plants, blossom before the break of dawn (4 - 5 am), evening primrose open up with the onset of dusk (5 - 6 pm) due to diurnal rhythm.
- ❖ **Palaeoclimatology**-Helps to reconstruct past climates of our planet and flora, fauna and ecosystem in which they lived. Example: Air bubbles trapped in ice for tens of thousands of years with fossilized pollen, coral, plant and animal debris.
- ❖ **Latitude**: Latitude is an angle which ranges from 0° at the equator to 90° at the poles.
- ❖ **Altitude**: How high a place is located above the sea level is called the altitude of the place.
- ❖ **Evergreen forests** - Found where heavy rainfall occurs throughout the year.
- ❖ **Sclerophyllous forests** -Found where heavy rainfall occurs during winter and low rainfall during summer.

- ❖ **Timber line / Tree line** : It is an imaginary line in a mountain or higher areas of land that marks the level above which trees do not grow. The altitudinal limit of normal tree growth is about **3000 to 4000m**.
- ❖ **Green House Effect Albedo Effect** Gases let out to atmosphere causes climatic change. Emission of dust and aerosols (small solids or liquid particles in suspension in the atmosphere) from industries, automobiles, forest fire, **So₂** and **DMS** (dimethyl sulphur) play an important role in disturbing the temperature level of any region. Aerosols with small particles is reflecting the solar radiation entering the atmosphere. This is known as **Albedo effect**. So it reduces the temperature (cooling) limits, photosynthesis and respiration. The sulphur compounds are responsible for **acid rain** due to acidification of rain water and destroy the ozone.
- ❖ **Indicators of fire** - *Pteris* (fern) and *Pyronema* (fungus) indicates the burnt up and fire disturbed areas. So they are called indicators of fire.
- ❖ **Fire break** - It is a gap made in the vegetation that acts as a barrier to slow down or stop the progress of fire.
- ❖ **Rhytidome**: It is the structural defense by plants against fire .The outer bark of trees which extends to the last formed periderm is called Rhytidome. It is composed of multiple layers of suberized periderm, cortical and phloem tissues. It protects the stem against fire , water loss, invasion of insects and prevents infections by microorganisms.

- ❖ Soil is the weathered superficial layer of the Earth in which plants can grow. It is a complex composite mass consisting of soil constituents, soil water, soil air and soil organisms, etc.
- ❖ **Loamy soil is ideal soil for cultivation.** It consists of 70% sand and 30% clay or silt or both. It ensures good retention and proper drainage of water. The porosity of soil provides adequate aeration and allows the penetration of roots.
- ❖ **Ecotone** - The transition zone between two ecosystems. Example: The border between forest and grassland.
- ❖ **Edge effect** - Those species are found in the ecotone areas are due to the effect of environment of the two habitats. This is called edge effect. Example: Owl in the ecotone area between forest and grassland.
- ❖ **Loamy soil is ideal soil for cultivation.** It consists of 70% sand and 30% clay or silt or both. It ensures good retention and proper drainage of water. The porosity of soil provides adequate aeration and allows the penetration of roots.
- ❖ **Proto Cooperation** An interaction between organisms of different species in which both organisms benefit but neither is dependent on the relationship. Example: Soil bacteria / fungi and plants growing in the soil.
- ❖ **Kairomone** released from *Pieris rapae* caterpillar exposed to wild Radish gets the capacity to transmit defence induced by predator to progeny of wild radish. Transmission capacity of defence induced by predator to progeny of wild radish.

- ❖ Lotus seeds showing highest longevity in plant kingdom.
- ❖ **Hygrophytes:** The plants which can grow in moist damp and shady places are called hygrophytes. Examples: *Habenaria* (Orchid), Mosses (Bryophytes), etc.
- ❖ In Xerophytic plants with the leaves and stem are covered with hairs are called **trichophyllous plants** . Example: *Cucurbits (Melothria and Mukia)*.
- ❖ **Tropophytes** are plants which behave as xerophytes at summer and behave as mesophytes (or) hydrophytes during rainy season.
- ❖ Out of three districts of Tamil Nadu (Nagapattinam, Thanjavur and Thiruvarur), Muthupet (Thiruvarur district) was less damaged by Gaja cyclone (November 2018) due to the presence of mangrove forest