PLANT ECOLOGY

- The study of plants and animals in reciprocal relationship with their environment is called Ecology
- The term ecology was first used by Reiter (1885) and followed by Haeckel (1886).
- Ecology for plants was employed by Warming (1895, 1905)
- E.P. Odum defined ecology as "structure and function of the nature"

- A group of similar individuals belonging the same species found in an area are called **population.**

- The assemblage of all populations belonging to different species in an area called **Community or Biotic community.**

- The term Ecosystem was coined by A. G. Tansley

- Ecosystem is the structural and functional unit of the nature.
- The interaction between the biotic and abiotic environments is called **Ecosystem**
- The biologically inhabited part of the earth consisting of all ecosystems of the world is called **Biosphere or Ecosphere**

- Warming classified plant communities on the basis of their relation or dependency on water

HYDROPHYTES

- The plants that grow in water or in very wet places are called **hydrophytes**

- The plants that freely float on water surface with out any contact with soil is called **Free floating hydrophytes** Eg: Pistia, Eichhornia, Wolfia, Salvinia

- Plant whose roots are fixed in mud but leaves float on the surface are called **Rooted hydrophytes** Eg: Nymphaea, Nelumbo and Victoria regia

- Completely submerged plants with no contact what so ever with soil or air is called **submerged suspended hydrophytes** Eg: Hydrilla, Ceratophyllum and Utricaria.

- Completely submerged plants in water but root system is in contact with muddy soil at the bottom of the pond is called **submerged rooted hydrophytes.** Eg: Vallisnaria, Potamogetan

- Plants that partly in water and partly in air are called **Amphibius plants** Eg: Ranunculus, Limnophila

- Some plants grow around water bodies with the water currents touching them occasionally, they also can survive dry periods Eg: Cyperus, Typha etc

ECOLOGICAL ADOPTATIONS IN HYDROPHYTES

Roots:

- Due to availability of plenty of water root system is secondary importance and least significant.
- Roots absent in **Wolfia, Ceratophylum**
- Poorly developed roots are seen in **Hydrilla**
- Submerged leaves compensate for roots in **Salvania**
- Root caps are absent in Hydrophytes

- Amphibious plants growing in mud will have distinct root caps
- Root caps are replaced by root pockets in Pistia
- If present roots are generally fibrous adventitious reduced in lenth unbranched or poorly branched.
- Balancing roots are present in Pistia, Eichornia

Stems:

- Stem is long slender and flexible in submerged plants Eg: Hydrilla, Potamogeton,
- Stem is slender or thick, short and spongy in free floating forms Eg; Eichornia
- Stem is a **rhizome** in rooted plants with free floating leaves Eg: Nymphaea and Nelumbo

Leaves:

- In submerged forms leaves are thin long and ribbon like (Eg: Vallisnaria) long and linear (potamogetan) finely dissected (eg; Ceratophylum)
- Floating leaves are large and flat with wax coating EG: Nyphaea, Nelumbo and Victoria regia
- Largest simple leaves in plant kingdom are present in **Victoria regia**
- Petioles are long flexible and covered with mucilage.
- Petioles are swollen and spongy in Eg: Eichornia, Trapa
- Hetrophily with submerged, floating and aerial leaves seen in Limniphila, Ranunculus and sagittaria

Anatomical Features:

- Cuticle is completely absent in submerged parts of the plants
- Cuticle may be present as a thin film on surface of parts exposed to atmosphere
- Epidermal cells are with chloroplast useful for absorption and assimilation.
- Stomata are totally absent in submerged hydrophytes
- Exchange of gases takes place through diffusion
- Non functional stomata are seen in Potamageton
- Epistomatous leaves (stomata found only on upper surface) are present in hydrophytes with floating leaves Eg; Nelumbo
- Mechanical tissues like collenchyma and sclerenchyma are more or less absent
- Xylem is poorly developed in Hydrophytes as the water absorption takes place all over the surface of the plant body
- Hydrophytes have aerenchyma in all parts of the plants. Aerenchyma provides buoyancy to the hydrophytes

MESOPHYTES

- Plants growing in the areas where water is not scarce or not abundant are called Mesophytes.
- Mesophytes live in a soil where pore space and water are equally occupied
- Mesophytic plants habitat shows best growth of forest and crop plants
- Tropical and temperate forests are all mesophytes

XEROPHYTES

- Plants growing in habitats where water supply is absent or physiologically dry are called Xerophytes
- Xerophytes classified based on their i) Morphology b) Physiology c) Life cycle pattern
- Plants growing in dry or arid zones are called **Ephimerals** or **Drough evaders** or **drought escapers Eg; Tribulus**
- Ephemerals are Annuals and complete their life cycles in 6-8 weeks
- Xerophytic plants absorbing more water during rainy season and storeing them in different body parts are called **Succulents or drought avoiding plants**
- Succulents store water in the form of mucilage
- Eg: Stem succulents : Opuntia

- Leaf succulents: Bryophylum, Aloe, agave
- Root succulents: Asparagus
- Perennial plants which can withstand prolonged period of drought are called Non-succulents or true xerophytes Eg: Casurina, Nerium, Ziziphus, Calotropis etc.
- Ecological adaptations of Xerophytes
- The all three major groups of xerophytes have some common adaptations to survive in very dry conditions

Roots:

- Root system is very well developed with extensive branching and often longer than shoot system
- Root hairs and root caps are very well developed

Stems:

- Mostly they are stunted, woody hard and covered with thick bark
- In some xerophytes stem becomes underground.
- In some plants stem becomes fleshy, green ,leaf-like phylloclades covered with spines, Eg: Opuntia
- Stems are usually covered by hairs and or waxy coatings

Leaves:

- Leaves are very much reduced, small scale like and some times modified in to spines to rduce the rate of transpiration. Lamina may be long narrow needle-like or divided in to many leaflets as Eg: Acacia
- Foliage leaves become thick fleshy and succulent or tough and leathery in texture Eg: Aloe
- Leaf surfaces are shiny glazed to reflect light and heat Eg Calotropis

Anatomical feature

- Epidermis is covered thik cuticle to reduce the rate of transpiration
- Epidermal cells may hve silica crystals
- Epidermis is multilayered Eg : Nerium
- Waxy coating is present on leaves and stem Eg: Calotropis
- Stomata are generally confined to lower epidermis of leaves called hypostomatous.
- Stomata are present in pits called sunken stomata. They are lined with hairs Eg: Nerium
- Mesophyll is differentiated in to palisade and spongy parenchyma
- Mechanical & vascular tissues are well developed