General biology-Botany

Lecture (2)

Importance of Plants , Plant Morphology

Importance of Plants

1. Environmental Importance

• Oxygen production through photosynthesis.

• Absorb CO_2 and reduce climate change.

• Prevent soil erosion and improve soil fertility.

• Regulate the water cycle.

• Provide habitats for organism s.

2. Economic Importance

• Main source of food.

• Raw materials for industries.

• Medicinal drugs. Many plants are sources of life-saving drugs and traditional medicines. example Quinine (from Cinchona): Used to treat malaria .Aspirin (from Salix or willow):Used for pain relief. Morphine (from Papaver somniferum)

3. Social and Cultural Importance

• Used in traditions and rituals.

• Improve mental health.

• Important for education and research.

4. Ecological Importance

• Base of food chains.

• Support biodiversity.

• Pollination and seed dispersal.

• Climate regulation.

5. Global Challenges

• Combat climate change.

• Prevent desertification.

• Renewable energy source.

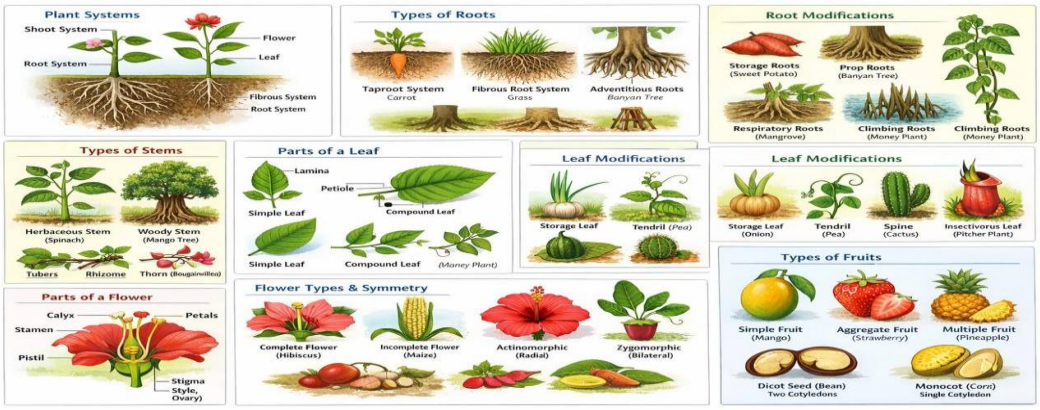
6. Health and Medicinal Importance

• Vitamins, minerals, fiber.

• Herbal and modern medicine.

Plant Morphology

Plant morphology is the study of the external form and structure of plants. It is important for plant identification, classification, and understanding adaptation to different environments.



Basic Plant Systems

Plants consist of two main systems:

• **Root System**: The underground part of the plant.

• **Shoot System**: The above-ground part including stem, leaves, flowers, and fruit

I. Root System

Types of Roots

• Taproot system: A main root with lateral branches; found in dicots (e.g., carrot).

• Fibrous root system: Many thin roots of equal size; found in monocots (e.g., wheat).

• Adventitious roots: Arise from stems or leaves (e.g., maize, banyan).

Root Modifications

• Storage roots: Store food (sweet potato).

• Prop roots: Provide support (banyan).

• Respiratory roots: Help in gas exchange in swampy areas (mangroves).

• Climbing roots: Help plants climb (money plant).

Shoot System

1. Stem

The stem supports the plant, transports water and nutrients, and may store food.

• Types:

• Herbaceous stems (spinach)

• Woody stems (mango)

• Stem Modifications:

• Storage (potato, ginger)

• Climbing (grape tendrils)

• Protection (thorns of Bougainvillea)

• Photosynthesis (cactus)

2. Leaves

Leaves are the main organs of photosynthesis.

• Parts: Lamina, petiole, stipules (in some plants).

• Types:

• Simple leaf (mango)

• Compound leaf (neem)

• Venation:

• Parallel venation (monocots)

• Reticulate venation (dicots)

• Leaf Modifications:

• Storage (onion)

• Tendrils (pea)

• Spines (cactus)

• Insectivorous leaves (pitcher plant)

3. Flowers

Flowers are the reproductive organs of plants.

• Parts: Calyx, corolla, androecium, gynoecium.

• Types:

• Complete flowers (hibiscus)

• Incomplete flowers (maize)

• Symmetry:

• Actinomorphic

• Zygomorphic

• Pollination:

• Self-pollination

• Cross-pollination

4. Fruits and Seeds

After fertilization, the ovary becomes a fruit and the ovule becomes a seed.

• Fruits:

• Simple (mango)

• Aggregate (strawberry)

• Multiple (pineapple)

• Seeds:

• Dicots: two cotyledons

• Monocots: one cotyledon