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PRAVARA RURAL EDUCATION SOCIETY

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# Department of Botany

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# **F.Y.B.Sc. Semester-I**

## **Paper II**

### **BO- 112 Plant Morphology And Anatomy**

IT- CREDIT-I

**CREDIT-I**

### **Chapter 1. MORPHOLOGY**

EDIT-I

# 1. MORPHOLOGY

- 1.1: Introduction, definition, descriptive and interpretative morphology.
- 1.2: Importance in identification, nomenclature, classification, phylogeny and Plant breeding.

# Introduction

Morphology – (Morphe = form + logos = study). It deals with the study of forms and features of different plant organs like roots, stems, leaves, flowers, seeds, fruits etc.

- The body of a typical Angiospermic plant is differentiated into :
  - ✧ an underground root system
  - ✧ an aerial shoot system.
- The shoot system consists of stem (including branches), leaves, flowers and fruits.
- The roots, stems and leaves are vegetative parts, while flowers constitute the reproductive part.

## Definition:

- **Morphology** is the branch of biology of that deals with the study and forms of various parts of plants and their specific special features.
- Plant morphology is defined as the branch of Botany dealing with external features/characters/structures of a plant.
- Plant morphology or phytomorphology is the study of physical form and external structure of plants.

- The external structures, size and shape of a whole plant, its leaf, root, stem, flower, fruit and even seed is studied under morphology.
- The habit of any plant such as herb, shrub, climber, twiner, tree is the morphological nature of that plant. The colour of flower, fruit and seed are also described in morphology.

# Descriptive and Interpretative morphology.

## Descriptive Morphology:

- It is the branch of biology that deals with the form and structure of organisms without consideration of function. In descriptive morphology, the morphological characters or features of the plant are broadly described in morphological terms.
- Descriptive morphology gives the detailed description of plant body in general, including its root, shoot, flower, fruit and seed. Minor details like scales, hairs, ornamentations, spines, colours, pigmentations, outgrowths, variation pattern, spore structure and the like are also studied in descriptive morphology.

## ➤ Interpretative Morphology:

It is the study of morphological characters with interpretation of origin, development, phylogeny, growth pattern etc.

- On the basis of knowledge of interpretative morphology, plant origin and development are analysed, correlated and interpreted and assigned to their taxonomic group
- e.g. particular species or variety or cultivar.
- The outcome of interpretative morphology is the indication of environmental or ecological conditions and physiological status of a plant.
- The specific morphological variations are interpreted and analysed to assume certain conclusions.



## 1.2.1 Importance of Morphology in Identification

Plant classification was based on habit and morphological characters. Theophrastus (370-285 B.C.) who is known as the "Father of Botany" had classified the plants into four groups as herbs, undershrubs, shrubs and trees.

- Some taxonomists used morphology of flowers, fruits and seeds to classify plants. English Botanist John Ray (1628 - 1705) published the system of classification based on forms and gross morphological structure of plants. He divided the plant kingdom as *Herbae* and *Arobores* (Herbs and trees).
- Whatever may be the system of classification, (artificial, natural,
- phylogenetic, modern, or ultra-modern), e.g. chemotaxonomy, molecular taxonomy, the systems have to first consider the broad base

## ➤ 1.2.2 Importance of Morphology in Nomenclature

Nomenclature means naming the plant. In taxonomy, binomial nomenclature is followed for naming the plant.

- First name is the name of genus and second name is the name of species.
- The names of the species of genera are given in a different manner. These names may be according to the place of origin,
  - e.g. *Mangifera indica* (Mango) indicates that the origin of mango is in India.
  - Another example is of the plant *Bauhinia purpurea*.
  - The *Bauhinia* genus is named after John and Caspar Bauhin, who were Swiss herbalists.

## ➤ 1.2.3 Importance of Morphology in Classification

Linnaeus (1707 - 1778) known as the "Father of Taxonomy" or "Father of Modern Botany" proposed an artificial sexual system of classification, based on morphological characters of plants.

- The best natural system of classification of plants proposed by Bentham and Hooker (1800 - 1884) is also based on comparative morphology, which is very important to decide the forms and relationships existing among plants in nature.
- Natural system classification of plants is most practical and highly useful in nature classification of plants.

- Morphological characters are used by all taxonomists because they are easily visible and can be conveniently employed in classification.
- Morphological characters are helpful for rapid identification and categorization of plants.

## ► 1.2-4 Importance of Morphology in Phylogeny

An evolutionary sequence, origin and inter-relationship between different plant groups is often interpreted on the basis of phylogenetic relationships in them.



- The similarities as well as dissimilarities in morphological features of higher plants like angiosperms and gymnosperms as well as lower plants like thallophytes, bryophytes and pteridophytes groups had played a major role in tracing the origin of subgroups, classes, orders and families of the above groups of plants.
- The similarities in morphological features clearly indicate the common ancestral stock from which the subgroups have evolved. In algae, fungi and bryophytes, the morphology of gametophytes (haploid plant) and sporophytes, the size and shape of gametes, gametangia, nature of flagella, size and shape of spores etc. play a key role in depicting their phylogeny as well as mono or polyphyletic origin of the plant group.

## ➤ 1.2.5 Importance of Morphology in Plant Breeding

Plant breeding and hybridization is of great importance in crop improvement. Thousands of high yielding and disease resistant hybrid varieties in cereals, millets, pulses, oilseed plants, fiber plants, horticulture, floriculture, fruits and vegetables are the gift of technology of plant breeding. In fact, this branch is the basis of green revolution in India.

➤ The selection of male and female parents in breeding is the first and foremost step, which is based on their important morphological features. The objective of breeding is fixed as per the need, especially to eliminate the drawbacks or demerits in male or female parent by crossing it with superior parents, having desirable traits.

- The traits considered are generally the height of the plant, nature of branching and foliage phyllotaxy, and more specifically nature of flower, corolla, stamens, (androecium) carpels (gynoecium), stigma and the most important is the type of pollination i.e. cross pollination or self-pollination.
- The ultimate aim of breeding is improvement in yield and its quality. If the yield is considered, the breeder concentrates on size of ear head, grains, pods, fruits, etc. which are almost all the morphological characters. In short, plant breeding also gives emphasis on morphological features.



Thank You!...