

Al-Mustaqbal University

College of Science

General biology-Botany

Professions Theoretical Lecture 4

Prof. Dr. Dhurgham Ali Al-Sultany

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### ****Plant Taxonomy****

Plant taxonomy is the branch of botany focused on the classification, identification, naming, and description of plants. It provides a systematic framework for understanding plant diversity, their relationships, and their evolutionary history. Below is a detailed breakdown:

### ****Objectives of Plant Taxonomy****

* **Identification**: Recognizing and determining the names of unknown plants.
* **Nomenclature**: Assigning standardized names to plants following specific rules.
* **Classification**: Grouping plants into categories based on their shared characteristics and evolutionary relationships.
* **Documentation**: Creating a record of plant species, including their descriptions and distributions.

### ****Hierarchical System in Plant Taxonomy****

Plants are classified in a structured, hierarchical system with the following ranks:

1. **Kingdom**: The broadest category.
   * Example: **Plantae** (the plant kingdom).
2. **Division (Phylum)**: Major groups within the kingdom.
   * Example: **Bryophyta** (mosses), **Magnoliophyta** (flowering plants).
3. **Class**: Subgroups within a division.
   * Example: **Magnoliopsida** (dicots), **Liliopsida** (monocots).
4. **Order**: Groups within a class.
   * Example: **Rosales**, **Fabales**.
5. **Family**: Related genera grouped together.
   * Example: **Rosaceae** (rose family), **Poaceae** (grass family).
6. **Genus**: A group of closely related species.
   * Example: **Rosa** (roses), **Triticum** (wheat).
7. **Species**: The most specific level, representing individual plants that can interbreed.
   * Example: ***Rosa indica***(Indian rose), ***Triticum aestivum*** (common wheat).

### ****Scientific Naming: Binomial Nomenclature****

* Devised by Carl Linnaeus in the 18th century.
* Each plant has a **two-part Latin name**:
  1. **Genus**: Capitalized (e.g., Mangifera).
  2. **Specific epithet**: Lowercase (e.g., indica).
  3. Together, they form the species name: Mangifera indica (mango).

### ****Major Groups in the Plant Kingdom****

Plants are categorized based on the presence or absence of vascular tissues, seeds, and flowers:

#### ****A. Non-Vascular Plants (Bryophytes)****

* Lack true vascular tissues (xylem and phloem).
* Examples: Mosses (Bryophyta), liverworts (Marchantiophyta), hornworts (Anthocerotophyta).

#### ****B. Vascular Plants (Tracheophytes)****

* Possess vascular tissues for transporting water and nutrients.
* Subgroups:
  + **Pteridophytes**: Seedless vascular plants (e.g., ferns, horsetails).
  + **Gymnosperms**: Seed-producing plants without flowers (e.g., pines, cycads).
  + **Angiosperms**: Flowering plants with seeds enclosed in fruits (e.g., roses, grasses).

### ****Evolutionary and Molecular Insights****

Modern taxonomy integrates:

* **Phylogenetics**: Understanding evolutionary relationships through genetic analysis.
* **Cladistics**: Classification based on common ancestry.
* **Molecular Taxonomy**: Using DNA and RNA sequencing to refine plant classifications.

### ****Importance of Plant Taxonomy****

1. Facilitates communication and research by providing a universal naming system.
2. Helps in biodiversity conservation by cataloging plant species.
3. Aids agriculture, medicine, and ecology by identifying useful or harmful plants.