Taxonomy

- Plant taxonomy is the science of delimiting, describing and naming appropriately taxa and arranging them in a natural system of plants.
- The term taxonomy was first given by the Swiss botanist Augustin Pyramus de Candolle in 1813 in his famous book Theory elementaire de la botanique. "Taxonomy is the theoretical study of classification, including its bases, principles, procedures and rules".
- "The first duty of taxonomist is to determine phylogenetic relationships'-Hall & Clements.

Components of Taxonomy

- Taxonomy is a major part of systematics that includes four componente Description, Identification, Nomenclature, and Classification.
- **Description**: Description is the assignment of features or attributes to a taxon The features are called characters. Two or more forms of a character are character states.
- **Identification**: Identification is the process of associating an unknown taxon with a known one, or recognizing that the unknown is new to science and warrants formal description and naming.
- **Nomenclature**: Nomenclature is the formal naming of taxa according to some standardized system. For plants, algae, and fungi, the rules and regulations for the naming of taxa are provided by the International Code of Nomenclature (ICN).
- **Classification**: Classification is the arrangement of entities (in this case, taxa) into some type of order. The purpose of classification is to provide a system for cataloguing and expressing relationships between these entities.

Systematics

Definitions of Systematics

The origin and development of systematics and human civilization started simultaneously, i.e., civilization of human being is the systematics or in other words we say that in our daily life those people who maintain their houses systematically.

Levels of Taxonomy

Mayr and Ashlock have divided the taxonomy into two levels.

1. Microtaxonomy
2. Macrotaxonomy

TAXONOMIC EVIDENCES FROM CYTOLOGY

- Cytology plays an important role in the study of plant taxonomy, systematic and evolution.
- A new area of research named Cytotaxonomy has emerged which utilizes cytological information for the elucidation of taxonomic problems.
- The chromosome number, morphology and behaviour at meiosis are the parameters considered significant.

Ranunculaceae,

Ranunculaceae, the buttercup family (order Ranunculales), comprising about 2,252 species in 62 genera of flowering plants, mostly herbs, which are widely distributed in all temperate and subtropical regions.

Papaveraceae

- **Papaveraceae**, the poppy family of flowering plants (order Ranunculales), with 44 genera and 825 species.
- Most of these are herbaceous plants, but the family also includes some woody shrubs and a genus of small tropical trees.

- The family is outstanding for its many garden ornamentals and pharmaceutically important plants. Most species are found in the Northern Hemisphere.

Lamiaceae

- **Lamiaceae**, the mint family of flowering plants, with 236 genera and more than 7,000 species, the largest family of the order Lamiales.
- Lamiaceae is distributed nearly worldwide, and many species are cultivated for their fragrant leaves and attractive flowers.
- The family is particularly important to humans for herb plants useful for flavour, fragrance, or medicinal properties.

Cladistics

Cladistics is a method of classifying species of organisms into group called clades , which consists only of firstly all the descendants of an ancestral organism and secondly the ancestor itself .

Geographic Information System

- A Geographic Information System (GIS) is a computer system that analyzes and displays geographically referenced information.
- It uses data that is attached to a unique location.
- Geographic Information System (GIS) term was coined by Roger F. Tomilinson (1960).

Acronym of GIS

The Acronym of GIS gives a clear picture as

Geographic (G) : Implies an interest in the spatial identity or locality of certain entities on under or above the surface of the earth.

Information(I) : Implies the need to be informed in order to make decisions.

System (S) : Implies the need for staff , computer hardware and procedures which can produce the information reduired for decision making that is data collection , processing and presentation.

Phylogenetic Analysis Using Parsimony(PAUP)

- PAUP is a program for phylogenetic analysis using parsimony, maximum likelihood, and distance methods (Swofford 2003).
- The program features an extensive selection of analysis options and model choices, and accommodates DNA, RNA, protein and general data types.
- Among the many strengths of the program are the rich array of options for dealing with phylogenetic trees including importing, combining, comparing, constraining, rooting and testing hypotheses.

Mesquite

- Mesquite is modular, extendible software for evolutionary biology, designed to help biologists organize and analyze comparative data about organisms.
- Its emphasis is on phylogenetic analysis, but some of its modules concern population genetics, while others do non-phylogenetic multivariate analysis. Because it is modular, the analyses available depend on the modules installed.

Interactive keys

Interactive keys are computer-aided identification tools that assist with finding the correct name for an unidentified specimen.

DELTA (DEscription Language for Taxonomy)

- The DELTA format (DEscription Language for TAxonomy) is a flexible method for encoding taxonomic descriptions for computer processing.
- DELTA-format data can be used to produce natural-language descriptions, conventional or interactive keys, cladistic or phenetic classifications, and information-retrieval systems.

Internet Directory of Botany

The Internet Directory of Botany is an index to botanical information available on the Internet, compiled by Anthony R. Brach .

Microsoft Office

Microsoft Office is a suite of productivity software that includes applications for various tasks, such as creating documents, analyzing data, and communicating effectively. It's used by millions of people around the world to enhance their work.

Microsoft Office Professional Plus 2021:-This comprehensive office suite includes applicationslike **Word**, **Excel**, **OneNote**, **Outlook**, **SharePoint**, **PowerPoint**, **Access**, **Designer**, and **Visio**.

GPS tagging

GPS tagging, also known as **geotagging**, involves adding geographical identification metadata to various forms of media, such as photographs, videos, websites, text messages, and QR codes.

Plant identification apps

Plant identification apps are handy tools for gardeners, explorers, and plant enthusiasts. Whether you're a gardener, a nature lover, or simply curious about the flora around you, these apps can help you identify various plant species. Here are some popular plant identification apps.

1.PlantSnap 2.iNaturalist 3.**Google Lens** 4.**PictureThis** 5. **LeafSnap**:

Features of a Garden

1. **Garden Wall and Fencing**:
   - **Garden Wall**: A well-constructed garden wall provides structure and defines boundaries. It can be made of stone, brick, or other materials.
   - **Fencing**: Fences serve as protective barriers, privacy screens, or decorative elements. Wooden picket fences, wrought iron fences, or living fences (hedges) all play a role in garden design.
2. **Hedges**:
   - **Living Hedges**: With the help of plants, live hedges can be formed and used as a fence or a green wall. They serve to screen specific areas, hide unwanted places, and partition the garden into different sections. Hedges also provide a natural background, like a frame to a picture [1].
3. **Trees**:
   - Trees form the main framework of a garden.
   - They add depth, grace, and abundance of bloom.
   - Trees can be chosen for their economic importance, aesthetic value, or both.
4. **Shrubs and Shrubberies**:
   - **Shrubs**: Grouping shrubs together creates a shrubbery.
   - Shrubs can be selected based on:
     - Showy or attractive flowers (e.g., Hibiscus, Ixora)

        - Fragrance (e.g., Jasmine, Rose)
        - Foliage (e.g., Crotons, Polycias)
5. **Climbers and Creepers**:
    - These ornamental plants grow over walls, trellises, arches, and other structures.
    - They can be light climbers (producing less wood) or heavy climbers (producing more wood).
    - Examples include sweet pea, morning glory, and Clitoria ternatea.
6. **Flower Beds and Borders**:
    - **Flower Beds**: Mass plantings of annuals and herbaceous perennials create colorful displays.
    - **Borders**: Continuous beds containing plants of one kind only.
7. **Rockery**:
    - A rockery is an arrangement of rocks, stones, and alpine plants.
    - It adds texture and interest to the garden.

Greenhouse

A **greenhouse** is a specially designed structure that regulates the temperature and humidity of the environment inside. Here are some key points about greenhouses:

- **Purpose**: Greenhouses are built to protect tender or out-of-season plants from excessive cold or heat.
- **Historical Evolution**:
    - In the 17th century, greenhouses were basic shelters made of brick or timber with some window space and heating.
    - As glass became cheaper and better heating methods emerged, greenhouses evolved into roofed and walled structures made mostly of glass.
- **Modern Greenhouses**:
    - Today, greenhouses are usually glass- or plastic-enclosed framed structures.
    - They provide controlled environments for growing fruits, vegetables, flowers, and other plants with specific temperature requirements.
- **Types**:
    - **Span-Type Greenhouse**: Has a double-sloped (A-shaped) roof.
    - **Lean-To Greenhouse**: Leans against the side of a building and has only one roof slope.
    - Sometimes, multiple span-type greenhouses are joined side by side to reduce external walls and heating costs.
- **Glazing Materials**:
    - Traditionally, glass was used for glazing, but plastic films (like polyethylene or polyvinyl) and fiberglass are also common.
- **Structure**:
    - Framing materials include aluminum, galvanized steel, or woods like redwood, cedar, or cypress.
    - Greenhouses are heated by sunlight and artificial means (steam, hot water, or hot air).
    - Ventilation systems are essential to prevent overheating.
- **Uses**:
    - Large greenhouses play a crucial role in agriculture, horticulture, and botanical science.
    - Smaller structures are popular among hobbyists, collectors, and home gardeners.

Topiary

Topiary is the art of shaping and training **perennial plants**—including trees, shrubs, and subshrubs—by **clipping their foliage and twigs** to create **distinctive and well-defined shapes**. These shapes can be either **geometric or fanciful**. Essentially, topiary involves sculpting living plants into specific forms, resulting in a type of **living sculpture**.

Roof garden

A **roof garden** is a delightful green space created on the rooftop of a building. These elevated gardens offer a unique blend of nature and architecture. Let's explore more about them:

1. **Purpose and Benefits**:
2. **Decorative Benefit**: Roof gardens enhance the aesthetics of a building, adding a touch of greenery to urban landscapes.
3. **Functional Advantages**:
    - **Temperature Control**: Roof plantings help regulate temperatures by providing insulation and reducing heat absorption.
    - **Hydrological Benefits**: They absorb rainwater, reducing runoff and contributing to better water management.
    - **Architectural Enhancement**: A well-designed roof garden complements the building's structure and design.
    - **Wildlife Habitats and Corridors**: These green spaces can serve as homes for birds, insects, and other wildlife.
    - **Recreational Opportunities**: Rooftop gardens offer a serene retreat for relaxation and leisure.
    - **Ecological Impact**: On a larger scale, they contribute to ecological balance.