

Pharmacognosy – I

[Unit – 4]

(Plant Taxonomy)



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PLANT TAXONOMY

Definition

- Taxonomy or systematic is the study or description on variations among organisms in order to come out with a classification system.
- Organisms that are arranged into groups enable a large population to be categorized and understood.
- Taxonomy began about 300 years before christ by Theophratus (370-285 BC)
- Carolus Linneaus (1707-1778) is regarded as the founder of taxonomy (father of taxonomy) till today.

Importance of Plant Taxonomy

- ❖ To arrange elements or taxa of plants into a more systematic manner so that they can be better understood and could be used easily and more effectively.
- ❖ To arrange data or information and knowledge about plants.
- ❖ To indicate the source and genetic relationship (phylogenetic), ancestry and origin of plants.
- ❖ To indicate the distribution and habitat of plants on earth and their benefits.

Taxonomic Components

Classification

Plants are arranged into groups of similar characteristics. The groups are considered as categories or taxa and form the taxonomic system.

Identification

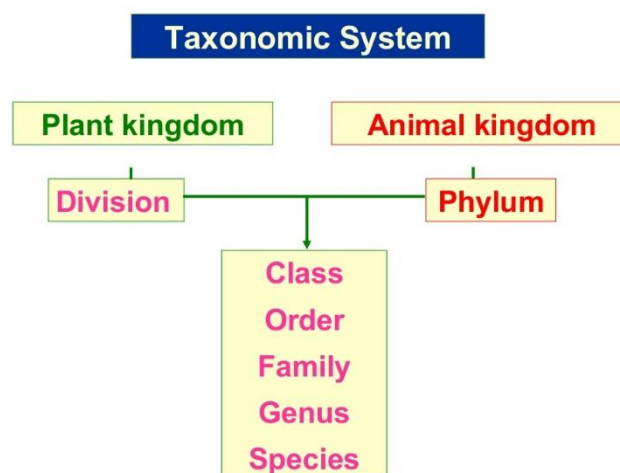
To identify and derive the name of an organism by referring to an existing classification.

Nomenclature

To provide a scientific name to an organism.

Description

To describe the characteristics of a taxon e.g. a family.



Plant Taxonomy

Introduction

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Importance

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To arrange elements or plants into in to a more systemic manner. So, they can be better understood and could be used easily, and more effectively.

Protista

A Protista is a eukaryotic organism that is not an animal, plant or fungus.

Eg. Paramecium, rhizaria, Forame, Gaint Kelp.

Eukaryotic organism

It having defined neuclous, chromosomes and ribosomes

Eg. Fungi, plant and animal.

Prokaryotic organism

Lake of nucleous, chromosomes and ribosomes

Eg. Eubacteris, archaes

Binomial Nomenclature

In this system, each name has two compounds.

Eg.	Mango	Mangifera	Indica
		(Generic Name)	(Species)
		Genus	Special Name

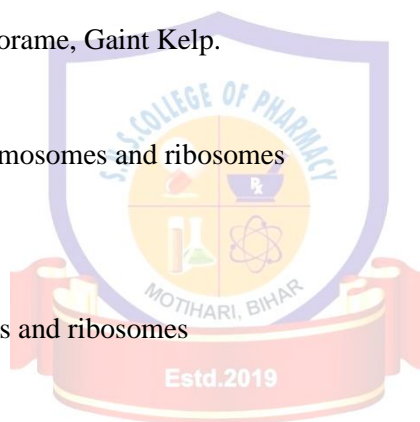
Spore

Is a cell/unit of sexual or asexual reproduction,

Eg. Algae, Fungi, Protozoa

Cultivar

- A unique species of a plant that is developed with special characters.
- But cultivar do not transfer the characteristics to offspring.



Apocynaceae Family

Introduction

- The apocynaceae family is one of the most medicinally diverse families in the plant kingdom and is a rich source for drugs that have found use both traditionally and in conventional medicine.
- The medicinal activity of these plants was due to the presence of alkaloids which were either indoline alkaloids or steroidal alkaloids.
- The family Apocynaceae consists of tropical trees, shrubs and vines.
- Characteristic features of the family are that almost all species produce milky sap.
- In traditional medicine, Apocynaceae species are used to treat gastrointestinal ailments, fever, malaria, pain and diabetes, including skin and ecto-parasitic diseases.
- Non-medicinal uses include food, poisons, fodder, wood, ornamentals, dye and perfume.
- A total of 4600 species under 415 genera belonging to the family Apocynaceae were collected and identified.
- Species of Apocynaceae have been reported to possess anticancer and antimalarial properties.
- Species having cytotoxic activity include those of Catharanthus,
- Catharanthus roseus is the most medicinally important plant in this family due to its use in the treatment of various types of cancers,
- Other agents that have been derived from this family include the alkaloids reserpine and rescinnamine which have been used against hypertension, others are the cardiac glycosides.

Estd.2019

Important plants of this family are,

1. Carissa carandas linn.
2. Catharanthus roseus linn.
3. Nerium oleander linn.
4. Plumeria alba linn.
5. Tabernaemontana divaricata linn.

Solanaceae Family

General characters, Distribution, Important plants

Systematic classification

Class: Dicotyledonae

Sub class: Gamopetalae

Series: Bicarpellatae

Order: Polemoniales

Family: Solanaceae

General Information

Common name: Potato family or Night shade family

Number of genera: This family includes 90 genera and about 3000 species

Propagation type: Fruit (dehiscent) or seed

Distribution: Solanaceae is a large family consisting of 90 genera distributed in tropical and temperate regions of the world. They are mainly found in Central and South America. In India, this family is represented by 15 genera and 88 species. Most of the species are cultivated throughout India and a few are found in Himalayas, Southern and Eastern India.



Vegetative characters of *Datura metel*

Vegetative characters

Habitat: Members of this family are mostly mesophytes and some are xerophytes (*Solanum suratense*).

Habit: The habit of the members of this family is variable. Some plants are annuals or perennial herbs (*Solanum nigrum*, *Solanum surattense*). Few plants are shrubs (*Solanum torvum*) and small trees (*Solanum verbascifolium*) and rarely climbers (*Solanum dulcamara*)

Root system: The members of this family have tap root system.

Stem: The stem is aerial, erect and mostly herbaceous. It is covered either by prickles (some species of *Solanum*) or spines (*Lycium*), spines are modified branches. In *Solanum tuberosum* the stem is an underground tuber.

Leaf: Leaves are simple, entire, lobed and petiolate. Leaves show alternate or terminal phyllotaxy in the vegetative regions. And in the region of inflorescence, leaves appear to be opposite or whorled due to the fusion of petiole with the internode. They are usually simple or pinnately lobed. Venation is reticulate.

Rutaceae Family

- The “Rue” family of flowering plant (order – Sapindales), composed of 160 genera and about 2070 species.
- Rutaceae includes woody shrubs, tree and few herbaceous perennials and distributed throughout the world. Especially in warm temperate and tropical regions.
- The largest no. is found in Africa and Australia, often in semiarid woodlands.
- The family contains a no. of economically important fruit tree as well as several ornamental species.
- Members of this family often feature aromatic leaves with oil glands on the surfaces.
- The flowers are generally containing both male & female reproductive organs in the same flower (Bisexual) or some time unisexual.
- They are arranged in inflorescences, which facilitates pollination by insects such as small flies and bees.
- The flowers are conspicuous for their color, fragrance and nectar.
- A citrus fruit is modified section berry known as hesperidium.

Mandarin orange:

The blossom and fruit of the orange (citrus).

The family contains economically important fruits.

Citrus species,

- Lemon – (*Citrus limon*)
- Sourorange – (*C. aurantium*)
- Sweetorange – (*C. sinensis*)
- Lime – (*C. aurantifolia*)

Others,

- Beal Fruit (*Aegle marmelos*)

Umbelliferae Family

- The umbelliferae family is named after the its shape of flower which are called umbels.
- The umbels are unique in their floral uniformity.
- These distinctive umbrella shaped blooms are attractive in arrangements and loved by numerous beneficial insects.
- They pollinate freely which allow it to increase its natural distribution.
- Seed dispersal occurs through wind.
- It is an Angiosperm plant.
- Its plants are use as important herbs.
- Many are poisonous.
- Members of this family are loaded with vitamins, minerals and antioxidants. Many are indispensable in favorite recipes and a treat raw or cooked.
- Type / Habit : Annual, biennial, perennial herbs or woody shrubs.
- Worldwide No. : 3000 species in 300 genera.
- Aroma : often pleasant or aromatic.
- The plants are erect.
- Roots : Either tape root or fusiform, branched.
- They passes alternate, undivided or divided leaves.
- The flowers are small, usually less then 1.2 cm in diameter, regular polygamous in umbels, rarely in heads.

Important drugs belonging from this family.

- | | |
|-------------|-----------------------|
| • Coriander | (Coriandrum sativum) |
| • Fennel | (Foeniculum vulgare) |
| • Carraway | (carum carvi) |
| • Dill | (Anethum graveolens) |
| • Anise | (Pimpinella anisum) |
| • Asafetida | (Ferula assa-foetida) |

Leguminosae/Fabacea

- Fabaceae are mostly herbs but include also shrubs, trees, vines, woody and climbers found in both temperate, sub-tropical and tropical areas.
- They comprise one of the largest families of flowering plants.
- This family having 670-700 genera and 20000 species.
- Leaves are stipulate nearly always alternate.
- Leaves/flowers having 5 calyx and corolla.
- Its also called pea, bean or pulse family or Legume family of flowering plant.
- This family having flowering plant.
- Plant are perennial or annual in the family.
- Many legumes have characteristics flowers and fruits.
- Worldwide 3rd largest family in Angiosperms (Flowering plant).
- Flowers are bisexual, some are unisexual.

- Fabaceae has three sub-families.
 1. Mimosoideae
 2. Caesalpinioideae
 3. Foboidea (Papilionoideae)
- The family having vary economically importance species.

Names of plants comes under this family

- Acacia
- Alfalfa
- Beans
- Cassia
- Clove
- Pea
- Peanut
- Redbud
- Mimosa
- Lupine
- Licorice
- Smoke tree
- Silk tree
- Soybean

Rubiaceae

- It is commonly called as coffee family.
- It has largest species 13150 and about 611 genus that makes it 4th largest angiosperm family.
- Rubiaceae family plant found worldwide in most habitats.
- Pollination of rubiaceae flower is almost always by animals, including insects, birds and bats.
- The family is represented by the several genera in our country eg. Cinchona, coffea, adina, hamelia, gardenia, rubia, morinda, and many others.
- Rubiaaceae contains a verity of commercially important plants.
- Common plants : Coffea arebica (Coffee Plant)

Cinchona officinalis (used in quinine production – used in fever)
- Habit : majority of the plants either tree or shrubs, but climbing habit is also found in this family.
- It is flowering family, It also known as Madder or Bedstraw family.
- It having three sub-families.
 - ❖ Cinchonoideae
 - ❖ Ixoroideae
 - ❖ Rubioideae
- Uses : Cinchona (Genus) – produce alkaloids (2ndry metabolites)

↓
Most common – { Quinine } – used in malaria