

Bentham and Hookers' Classification of Plant Kingdom

INTRODUCTION

Taxonomy: Taxis + nomos

It includes two Greek words

Taxis – arrangement, Nomos – laws

Taxonomy concerns with laws governing classification of plants. The word 'taxonomy' was coined by A.P. de Candolle. Taxonomy may deal with plants or animal. Plant taxonomy is called **systematic botany**.

BASIS OF PLANT TAXONOMY

1. Identification
2. Nomenclature
3. Classification

1. Identification: It is necessary to assess whether a collected plant is entirely new or already known. This can be done with the help of herbarium / flora.

- **Herbarium:** It is a collection of dried and preserved plant specimen which are arranged according to system of classification.
- **Flora:** It is a book containing the details of habitat and distribution of plant species of particular area

2. Nomenclature: Giving a correct scientific name to an identified plant.

Binomial Nomenclature:

- It is giving a correct scientific name to an identified organism with two Latin words.
- First word is Generic name and it starts with capital letter.
- Second word is species name and it starts with small letter.
- Scientific names should be italics or underlined separately.
- **AIM:** To avoid confusion which comes due to different common names for same plant.
- **Earlier, plant names were polynomial:**

Eg. *Caryophyllum saxatile folis gramineis umbellatis corymbis*

Which means Caryophyllum growing on rocks having grass like leaves and umbellate corymbose inflorescence. This type of polynomial nomenclature is not valid now. The valid nomenclature is binomial nomenclature.

- Binomial nomenclature was first introduced by Gaspard Bauhin but it was strictly followed by Carl Linnaeus in his book 'Species Plantarum'.

ICBN: International Code of Botanical Nomenclature. ICBN frames some rules for nomenclature

Rules of ICBN:

- Every plant should have only one valid scientific name all over the world.
- Binomial nomenclature should be strictly followed.
- Scientific name of plant should be in two Latin words.
- Scientific name of plant should be in italics or should be underlined separately.
- **Author citation:** The person who publishes the description of any plant species or giving a new name to plant is considered as author. The name of author should be given in abbreviated form at the end of scientific name is called author citation.

Eg. *Oryza sativa* (L.) – Linnaeus described it

Pennisetum glaucum R. Br. – Robert Brown described it

- **Type specimen:** While naming a new plant, the plant specimen should be prepared with its original description mounted on herbarium sheets and the same should be preserved in any of the recognized Herbarium. It is called 'type specimen'.

Recognized Herbaria

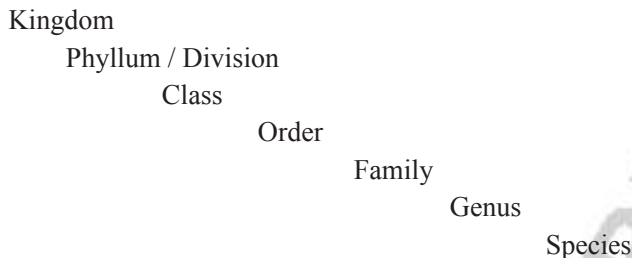
- Royal Botanical Garden, Kew, London
- Indian Botanical Garden, Kolkata, India
- Botanical Survey of India, Coimbatore, Tamil Nadu
- **Tautonyms:** Giving the same word to Generic and species name. It is not accepted in the system of classification. Eg. *Malua malus*

3. Classification: Grouping of living organism systematically called biosystematics. There are three systems of classification.

- Artificial system
 - Natural system
 - Phylogenetic system (Cladistics)
- (i) **Artificial system:** This system of classification is based on one or two easily recognized characters.
Eg. Theophrastus classified plants into Trees, Shrubs, Under shrubs and Herbs. He is called 'Father of Botany'.
- (ii) **Natural system:** This system of classification is based on natural similarities of vegetative and floral characters. Eg. Bentham and Hooker classified plants into Cryptogams and Phanerogams.

(iii) **Phylogenetic system / Cladistics:** This system of classification is based evolutionary and genetic relationship of an organism. Eg. Engler and Prantle classified Bacteria and plants into 14 divisions.

Units of classification: The classification system is made up of different units called 'taxon' and they are arranged in hierarchical sequence.



The basic unit of classification is '**Species**' which is defined as group of individuals which resemble in their morphological and reproductive characters and interbreed among themselves to produce fertile offsprings.

Systematic Position of Rice

- Kingdom : Plant kingdom
- Phylum : Phanerogams
- Class : Monocotyledon
- Family : Poaceae
- Genus : Oryza
- Species : *sativa*

BENTHAM AND HOOKER CLASSIFICATION

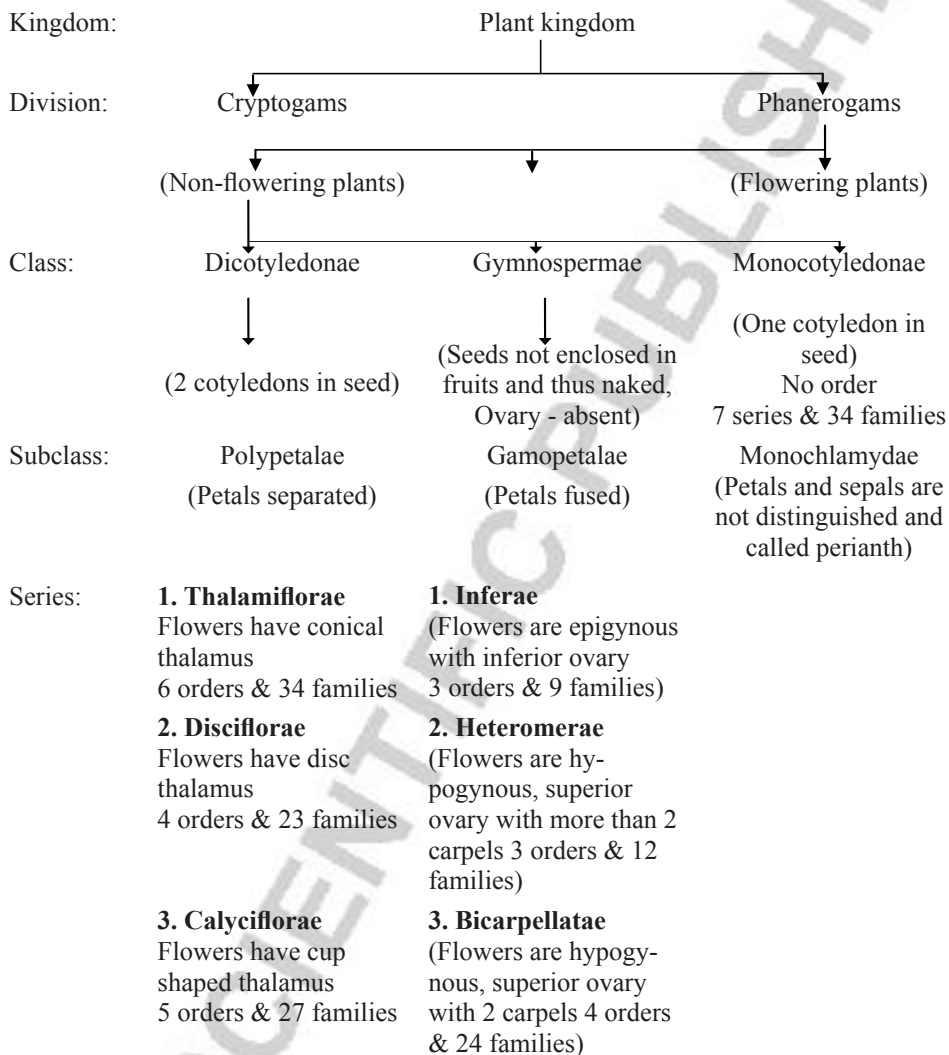
- It is natural system of classification.
- Bentham and Hooker were British taxonomists closely associated with Royal Botanical Garden, Kew.
- They published a book "Genera Plantarum" in three volumes in which they identified, named, described and classified 97,205 species which were grouped into 202 orders (now called families).
- While classifying plants they gave importance to free and fused petals and relative position of ovary.

| Bentham and Hooker's Classification | Engler and Prantle's Classification |
|--|---|
| <ul style="list-style-type: none">• It is a natural system of classification• Theory of reduction is in operation• Dicots were placed ahead of gymnosperms and monocots• This classification is followed in common wealth countries | <ul style="list-style-type: none">• It is a phylogenetic system of classification• Theory of evolution is in operation• Monocots were placed ahead of dicots and gymnosperms• This classification is followed in American and European countries |

Out-line of Bentham and Hooker Classification

Kingdom

Out-line of Bentham and Hooker classification



Author Citation

A name cannot be complete without an author's name. The author's name is abbreviated, e.g., Linnaeus is abbreviated as Linn or L, Bentham as Benth; Hooker as Hook, Roxburgh as Roxb, Lamark as Lamk etc. The indications of name of a taxon are to be accurate and complete. It is necessary to cite the name of the author who first validly published the name. If the author's name is too long it should be abbreviated. e.g., *Gossypium hirsutum* L., *Solanum nigrum* Linn etc.

When a genus or taxon of a lower rank is altered in upper rank but retains its name or epithet, the author who first published this as a legitimate name or epithet must be cited in parentheses; followed by the name of the author who effected the alternation e.g., *Cirtus aurantium* var. *grandis* L; when raised to rank of species it becomes *Citrus grandis* (L) Osbeck. Here L is the first author and Osbeck altered it.

AGRICULTURAL CLASSIFICATION OF CROPS

1. **Cereals and Millets:** The word cereal is derived from 'Ceres' which means Roman Goddess of Harvest. Larger grain of poaceae is called cereals. Eg. Rice, Wheat, Maize.

Small grain of poaceae is called Millets. Eg. Sorghum, Pearl millet. Very small grain of poaceae is called minor millets / small millets. Eg. Ragi, Thenai, samai,

2. **Pulses:** The term pulse is used to denote the seeds of leguminous plants. They are rich in protein and form chief source of protein in vegetarian diet. Eg. Blackgram, Greengram, Redgram, Cowpea.

3. **Oil seeds:** They are the sources of vegetable oils and give taste to the food. Eg. Groundnut, Gingelly.

4. **Fibers:** Fibers are obtained from these crops. Eg. Cotton, Jute, Mesta, Sunnhemp.

5. **Sugars and Starches:** Sugars act as sweetening agent. Eg. Sugar cane, Sugar beet.

Starches are not sweetening agent but they are polysaccharides of simple sugar. Eg. Tapioca.

6. **Vegetables, Fruits and Nuts:** They supply vitamins and minerals. Eg. Cucurbits, Apple, Cashew.

7. **Beverages:** These are drinks which have stimulating effects upon drinking. Eg. Coffee, Tea.

8. **Narcotics, Fumitories and Masticatories:**

Narcotics: They produce stimulating effects up on placing on tongue. Eg. Opium.

Fumitories: They produce stimulating effects up on smoking. Eg. Tobacco.

Masticatories: They produce stimulating effects up on chewing. Eg. Betelvine.

9. **Spices and Condiments**

Spices: They are added in small quantity in food for flavour & taste. Eg. Pepper, Cardamon.

Condiments: They are added in small proportion in food to add flavour & taste. Eg. Onion, Garlic.

10. **Rubber:** They provide raw material for manufacture of rubber. Eg. Rubber.

11. **Forages:** Forages provide feed for domestic animals. Fodders are plant materials obtained after cutting the forage plant.

- **Forage grass:** Cumbu Napier Hybrid.
- **Forage legume:** Alfalfa
- **Tree fodder:** Agathi

12. Green manures and Green leaf manures

- **Green manure:** They are grown *in situ* in the field and ploughed *in situ* to decompose as manure. Eg. Sunnhemp, Dhaincha.
- **Green leaf manure:** They are grown outside the field and the leaves & toppings are put in the field to decompose as manure. Eg. Neem, Gliricidia.