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Taxonomic hierarchy

Series of Ranks provided by ICBN (International Code of Botanical Nomenclature):

Rank of taxa	Endings of ranks above genus	Example
Division	-phyta	Magnoliophyta
Class	-opsida	Magnoliopsida
Sub-class	-idae	Rosidae
Order	-ales	Fabales
Family	-aceae	Fabaceae
Sub-family	-oideae	Caesalpinioideae
Tribe	-eae	Cassieae
Sub-tribe	-inae	Cassiinae
Genus		*Cassia*
Species		*fistula*
Sub-species		
Variety		
Form		

- ❑ The formal taxonomic hierarchy is a system of categorical ranks with associated names.
- ❑ Generally, **the species is the basic unit of classification**.
- ❑ Each species belongs to a series of taxa of consecutively higher rank.

Categories

- The International Code of Botanical Nomenclature (ICBN) provides the series of ranks with names that are the hierarchical categories.

- The Code, in effect, defines the categories only by listing their sequence. It may not be necessary to use all the categories provided by the Code for a small order, family, or genus, but the sequence of categories must not change. However, certain categories (i.e., species, genus, family) are essential if nomenclature is to function.

- The categories commonly used in the flowering plants are the class, subclass, order, family, genus, species, and sometimes either subspecies or variety or even sometimes both.
- Categories such as subfamily, tribe, subgenus, section, and so on may be used and are frequently necessary in large and complex groups. In actual practice, species are grouped into genera and genera into families and so on through the sequence of categories. Each rank in turn is more inclusive than the lower categories.

Importance:

The categorization gives order and accessibility to the classification of plants and **provides a meaningful system of information** input or retrieval.

The Code requires standardized grammatical endings for the categories from **division down to subtribe**.
However, an exception is the use of certain family names which have been sanctioned by the Code because of old, traditional usage. These names do not end in the usual family ending of **–aceae** (Article 18)

Botanists are authorized by the Code to use either of these alternatives as family name:

Old name	New name
Palmae	Arecaceae
Gramineae	Poaceae
Cruciferae	Brassicaceae
Leguminosae	Fabaceae
Guttiferae	Clusiaceae
Umbelliferae	Apiaceae
Labiatae	Lamiaceae
Compositae	Asteraceae
#Note-1: Some manuals use the older names and others use the *–aceae* names. #Note-2: Family names with **–aceae** are based on generic names.	

Principles of Plant Taxonomy

- Taxonomy is based on the similarities and dissimilarities among organisms.
- Historically, taxonomy has been a descriptive science based on the variation and form of morphological characters.
- The classification schemes of the taxonomists of the 1700s and 1800s placed similar-appearing organisms together in species, comparable species into genera, and genera with resemblances into families.
- In 1948 H J Lam proposed the term **taxon (plural:taxa) to indicate taxonomic groups of any rank**.

Species:

- The species has been considered to be the **basic unit of all taxonomic work**.
- It is the category on which the binomial system has been established.
- It is the category that has received more attention by biologists than all others combined.
- In taxonomic practice, **a group of individual plants that is fundamentally alike** is generally treated as a species.
- Ideally, a species should be separated by distinct morphological differences from other closely related species.
- The species is **the smallest natural populations permanently separated from each other by a distinct discontinuity in the series of biotypes** (Rietz, 1930).

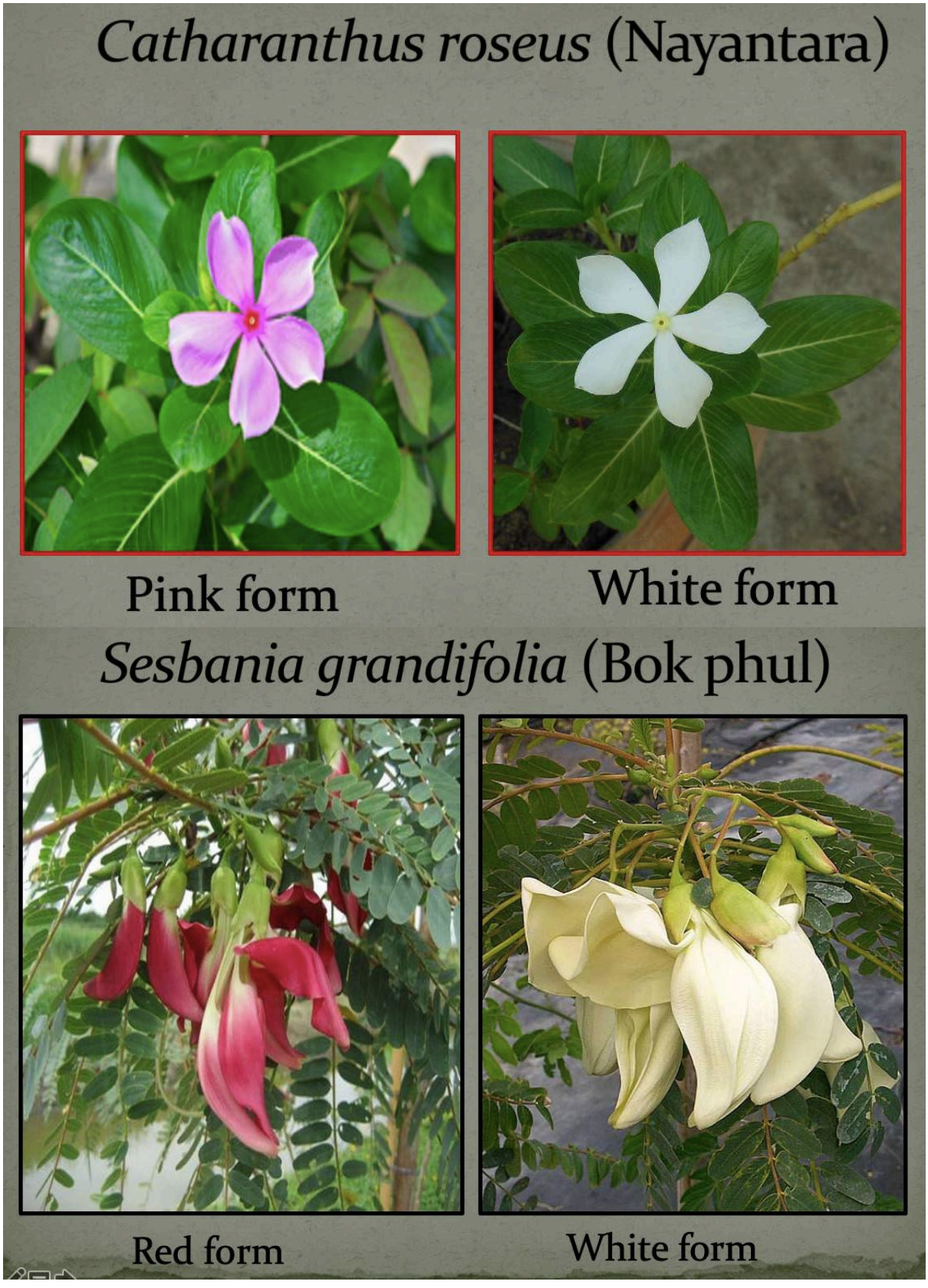
A species is a concept that cannot be defined in exact terms and is not absolute and inelastic. Rigorous definitions of species are not possible because the criteria may change with the characteristics of each group.
In developing concepts of species, specimens should be regarded as samples of living, reproducing populations of genetically related individuals. Many different kinds of species have developed by diverse evolutionary and genetic mechanisms. Different species may have various strategies of reproductive isolation that reduce or prevent interbreeding.

Infraspecific Taxa:

Infraspecific Taxa: A species embraces the variation within its populations.
To manage some of the recurring variation, three infraspecific categories are used by plant systematics to provide formal taxonomic recognition of variation within species.
These are **subspecies, variety and form.**

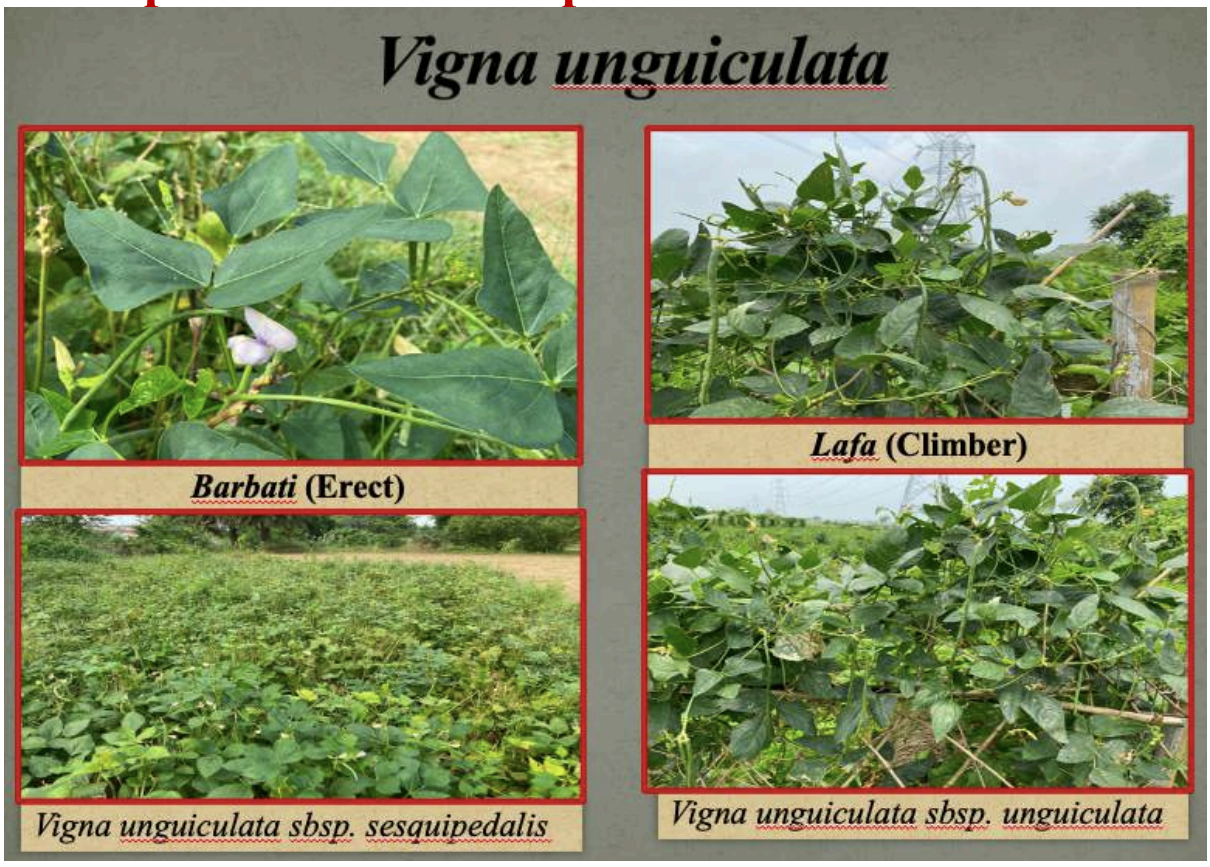
Here are some examples:

Infraspecific taxa: Form



Infraspecific taxa: Variety

Infraspecific taxa: Sub-species



Genera:

- Like species, the genus represents a concept.
- From a practical standpoint, the genus is an inclusive category whose species have more characteristics in common with each other than with species of other genera within the same family.
- Genera, therefore, are aggregates of closely related species (Lane & Turner, 1985).
- The genus is subordinate to the family. Each family is comprised of one or more genera.
- The generic name of a plant is the first of the two words comprising a binomial.

Family:

Much of what has been said about the concept of the genus applies equally to the concept of the family.
Ideally, families should be **monophyletic** and present both a biologically meaningful treatment and a practical taxonomy.

The **natural family** is one whose members were derived from a common ancestral stock (i.e., of monophyletic origin).

Examples of **unnatural families** are **Saxifragaceae** and **Onagraceae**. They must have been derived from heterogenous and relatively unrelated ancestors; that is, they are presumed to be of **polyphyletic origin**.

Both reproductive and vegetative features are used to characterize families (Cronquist, 1968).
The family usually represents a more natural unit than any of the higher categories.

Biological Species Concept:

Biological Species: A group of organisms that can successfully interbreed and produce fertile offspring.
Here, **the integrity of species** is maintained by **interbreeding within a species** as well as by **reproductive barriers** between organisms in different species.

Evolutionary Species Concept:

Evolutionary Species: A single linage of ancestor-descendant populations of organisms which maintains its identity from other such lineages and which has its own evolutionary tendencies and historical fate (Wiley, 1981).

Taxonomic Species Concept:

Taxonomic Species:
It includes a group of morphologically similar organisms.

Tautonym:

A scientific name in which the same word is used for both genus and species.
Tautonym is valid in Zoology.

Tautonymic Species:

Naja naja,
Vulpes vulpes (Red fox)

Para-Tautonym:

A para-tautonym is almost tautonym where the word used in species is repeats in genus but not the vice-versa.
Para-tautonym is valid in Botany.

Para-Tautonymic Species:

Cajanus cajan,
Samanea saman,
Sesbania sesban

.....Thank YOU.....