



Taxonomic Resources Part 3 (Flora and Manual)

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Definition:

- **A flora** is a taxonomic aid which maintains an account of exact habitat and distribution of plants occurring in a given region.
- **A manual** is a book that provides an inventory (detailed list) of the flora and means of identification of plants using descriptive keys.

Difference: Both flora and manual maintain description of all plants found in an area. But flora maintain account of **HABITAT** and **DISTRIBUTION** of the species whereas manual maintains useful information for **IDENTIFICATION** of plants of the area.

Major floras and manuals dealing with Indian Plants:

- **Hooker, J.D.** (1875-1897) *The flora of British India*. 7 volumes., L.Reeve & company , London.
- **Bor, N.L. and M.B.Raizada** (1954) *Some beautiful Indian climbers and shrubs*. Bombay Natural History Society, Bombay.
- **Roxburgh, W.** (1832) *Flora Indica*. 3 Vols., W.N.Allen & Co., London.

Regional Floras:

- **Bor, N.L. (1941) *Common grasses of the United province*.** Indian forest records 2, FRI, Dehradun.
- **Duthie, J.F. (1903-1922) *Flora of Upper Gangetic Plain and of the adjacent Siwalik and sub-Himalayan tracts*.** 3 vols., Govt. of India, central Publication Branch, Calcutta.

District Flora:

- **N.K.Dubey and Nirmal Kishore.** (2021) *Urban Flora of Varanasi.*
- **Santapau, H.** (1957) *The flora of Purandhar.* Oxford Book Company., New Delhi.
- **Srivastava, T.N.** (1976) *Flora Gorakhpurensis.* Today and Tomorrow's Publ., New Delhi.

Forest Flora:

- **Kanjilal P.C.** (1933) *A forest flora of Pilibhit, Oudh, Gorakhpur and bundelkhand*. Supdt. Printing and Stationary, United Prinvince, Allahabad.
- **Parkinson, C.E.** (1923) *A forest flora of Andaman Islands*. Calcutta.

Threatened Plants of India:

- Jain, S.K. and A.R.K. Sastry (1980) *Threatened Plants of India. A state-of-the Art report.* BSI, Calcutta.
- Jain, S.K. and A.R.K. Sastry (1984) *Red Data Book of Indian Plants.* BSI, Calcutta.

Monographs and Revisions:

- **Monograph** of a taxon such as family or genus, is a detailed treatment including all significant information of a morphologic and taxonomic nature concerning the taxon.
- A taxonomic **revision** differs from monograph primarily in the degree of scope and completeness. Often it accounts for **only a section of a genus or for the elements restricted to a smaller geographical area.**
- A **conspectus** is an effective outline of a revision.
- A **synopsis** is a list of taxa.

- **Icones (Illustrations):** Icone is the perfect, natural diagram or picture of the plant.
- **Taxonomic Journals:** A journal is a publication appearing usually at regular intervals.
- **Dictionary:** A botanical dictionary may list and describe all known genera of certain plant groups.
- **A Glossary:** is an alphabetical list of difficult terms with their explanations.

Plant Identification

Identification may be defined assignment of plant to a particular taxonomic group.

Identification can be done either by the aid of literature or comparing specimen with previously identified plant.

Consulting flora, manual, monograph, revision etc.

Careful examination of specimen needed using following tools:

A good hand lens (10X magnification); pair of sharp-pointed forceps; couple of dissecting needles; razor blade.

Taxonomic Keys (Rapid, easy, convenient)

Taxonomic key is an artificial analytical device useful in identifying an unknown plant.

- **J.P.Lamarck (1778)** first used key for identification of plants.
- Key is always **analytical** in nature.
- Key is used for **identification** of plants and animals based on **similarities** and **dissimilarities**.
- Takes into account **easily observable traits**.
- It is based on **elimination**.
- **Separate** taxonomic keys are assigned for different taxon eg. Genus, family, class etc.

Based on the arrangement of characters and their utilization, two types of taxonomic keys are recognised.

- 1. Single-access or Dichotomous or sequential keys**
- 2. Polyclave or Multi-access or multi-entry keys**

SINGLE-ACCESS OR SEQUENTIAL KEYS (= DICHOTOMOUS KEYS)

- A single key is an identification key where the sequence and structure of identification steps is fixed by the author of the key.
- Only one character taken at a time.
- Uses pair of contrasting characters “**couplets**”.
- Each character is called a “**lead**”.
- Out of the pair of characters, one is selected, other is rejected.
- Each couplet has 2 leads...Lead 1 and lead 2
- Eg. 10 flowers with stamen numbers 1, 2, 3, 4,.....10. So two leads can be designed:

Lead 1- stamen number 5 or less

Lead 2- stamen number more than 5

Lead 1 will result in elimination of 5 taxa.

Single access key is of two types:

(i) Yolked / Indented Key

(ii) Bracketed or Parallel Key

| Plant Name | Fruit type | Plant herb | Calyx corolla NOT differentiated | Nectary | Spur |
|-------------------|------------|------------|--|---------|-------|
| <i>Ranunculus</i> | Achene | + | - | + | - |
| <i>Adonis</i> | Achene | + | - | - | - |
| <i>Anemone</i> | Achene | + | + | - | - |
| <i>Clematis</i> | Achene | - | + | - | - |
| <i>Caltha</i> | Follicle | + | + | - | - |
| <i>Delphinium</i> | Follicle | + | + | - | + (1) |
| <i>Aquilegia</i> | Follicle | + | + | - | + (5) |

This example is from family Ranunculaceae. Here we are learning how to identify plants of this family using Single access keys.

Yolked keys/Indented key

1. a. fruit achene.....Go to 2
2. a. calyx-corolla differentiated.....Go to 3
 3. a. Nectary present.....*Ranunculus*
 - b. Nectary absent.....*Adonis*
2. b. calyx-corolla not differentiated.....Go to 4
 4. a. Plant herbaceous.....*Anemone*
 - b. Plant woody.....*Clematis*
1. b. fruit follicle.....Go to 5
 5. a. Spur absent.....*Caltha*
 - b. Spur present.....Go to 6
 6. a. Spur 1.....*Delphinium*
 - b. Spur 5.....*Aquilegia*

Bracketed or Parallel Key

1. a. fruit achene.....Go to 2
b. fruit follicle.....Go to 5
2. a. calyx-corolla differentiated.....Go to 3
b. calyx-corolla not differentiated.....Go to 4
3. a. Nectary present.....*Ranunculus*
b. Nectary absent.....*Adonis*
4. a. Plant herbaceous.....*Anemone*
b. Plant woody.....*Clematis*
5. a. Spur presentGo to 6
b. Spur absent*Caltha*
6. a. Spur 1.....*Delphinium*
b. Spur 5.....*Aquilegia*

MULTI-ACCESS KEYS OR POLYCLAVE KEYS

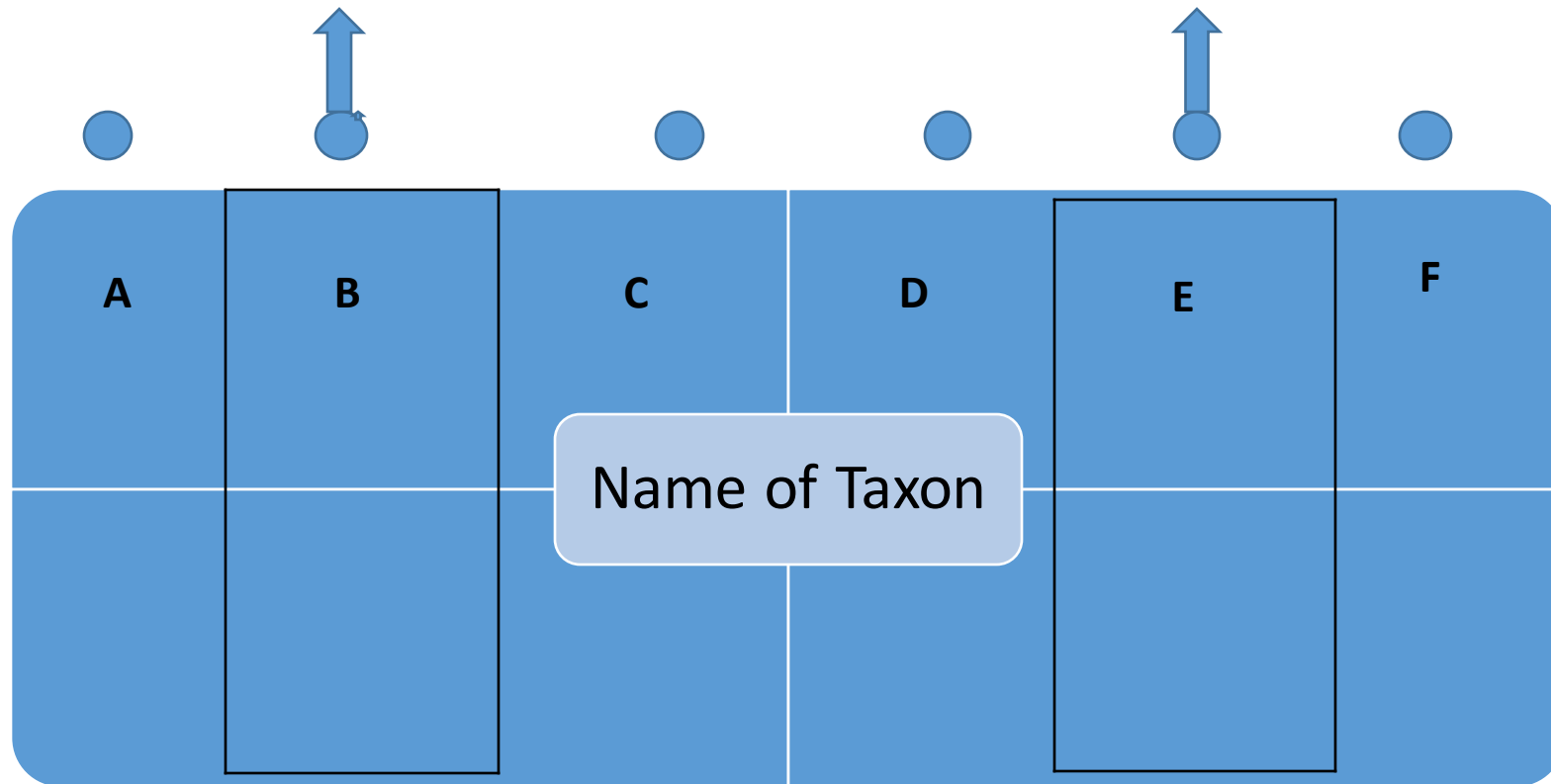
- It is a computer aided identification tool.
- In this key, characters can be used in any order.
- Characters are ordered to start with the one that best separates the remaining taxa.
- It can adjust characters according to user skills and abilities.
- It reduces the possibilities.
- It can be used by mobile phones.
- You can select or search species according to their geographical position.
- The older method of identification by multiple-access keys involves the use of cards. **Peek-a boo** and **edge-punched cards** are two basic type of cards.

Peek-a boo card

| PLANTS HERBACEOUS | | | | | | | | | |
|-------------------|----------|----|----|----------|----|----|----------|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |

Genera 1,2, 5 and 8 exhibit herbaceous habit.

Edge-punched card



The taxon possesses characters B and E

Computer-constructed Keys

- Appropriate programs may be developed which can construct a taxonomic key based on the information about the taxa in the same manner and based on the same logic which is used to construct manual keys.
- Some popular software packages are: DELTA, Discover Life and Xper 2.
- **DELTA** system is an integrated set of programmes based on the DELTA format (**DE**scription **L**anguage for **TA**xonomy) which is a flexible and powerful method of recording taxonomic description for processing by a computer.

Advantages of Multi-access keys

- They are in form of computer-aided interactive keys.
- One can select or enter information about an unidentified specimen in any order.
- The computer rules out possible identification of the entity.
- It also simultaneously presents the user with additional helpful information and guidance on what information to enter next.

References

- Book by Singh, Pande and Jain
- Book by B.P.Pande