Plant Identification and Development of Keys

PLANT IDENTIFICATION

Plant identification implies assigning a plant to a particular taxonomic group – ultimately to the species. The identification of plant specimen is its determination of as being identical with or similar to another and already known plant.

Methods of Plant Identification

First Method

The first step is the determination of the families to which the unknown plant belongs.

Knowing the name of the family one can turn the keys to genera for determining the generic name and then for the specific identity of the plant to the species key.

Second Method

Second method is the utilization of the latest floras and check list of the particular region.

Third Method

Third method is the identification by means of monographs or revisionary works accounting for the particular family or genus.

Plant Characters to be recorded before Its Identification

1. *Nature of specimen – herbaceous, or woody; annual or perennial.*

2. *Phyllotaxy and venation.*

3. *Inflorescence type – Capitulum, Cyathium, Verticellaster*

4. *Flower and its parts – actinomorphic or zygomorphic.*

5. *Presence of epicalyx*

6. Number of sepals and petals or tepals, their aestivation

7. Petals free or fused

8. Number of stamens and their position

9. Count number of carpel/carpels, style

10. Type of placentation.

A key is a device, which when properly constructed and used, enables a user to identify plants.

Keys are devices consisting of a series of contrasting or contradictory statements or propositions requiring the identifier to make comparisons and decisions based on statements in the key as related to the material to be identified.

A taxonomic key is a device for quickly and easily identifying to which species an unknown plant belongs.

Suggestions for the Use of Taxonomic Keys:

- *Appropriate keys should be selected for the materials to be identified*
- *The introductory comments on format details, abbreviations, etc. should be read before using the key*
- *A glossary should be used to check the meaning of terms, which one does not understand*
- *Both the leads of a couplet should be read before making a choice*

- *Several similar structures should be measured, when measurements are used in the key*, e.g. several leaves and not a single leaf should be measured

- *The results should be verified by reading a description, comparing the specimen with an illustration or an authentically named herbarium specimen*

Suggestion for Construction of Taxonomic Keys:

- ✓ *Constant characteristics rather than variable ones should be used*
- ✓ *Proper measurements rather than terms like "**large**" and "**small**" should be used*
- ✓ *Characteristics that are generally available to the user of the key rather than seasonal characteristics or those seen only in the field should be used*
- ✓ *A positive choice should be made. The term "is" instead of "is not" should be used.*

- ✓ *If possible one should start both choices of a pair with the same word*
- ✓ *If possible, different pairs of choices should be started with different words*
- ✓ *The descriptive terms should be preceded with the name of the part to which they apply*

Types of Taxonomic Keys

There are two types of keys:

1. *Dichotomous*

2. *Poly clave (also called Multiple Access or Synoptic).*

DICHOTOMOUS KEYS

Dichotomous comes from the Greek root dich meaning "***two***" and temnein meaning "***to cut***"

Couplets can be organized in several forms. The couplets can be presented using numbers (*numeric*) or using letters (*alphabetical*).

Example of a numerical key with couplets
1. Seeds round—soybeans 1. Seeds oblong go to—2 2. Seeds white—northern beans 2. Seeds black—black beans
Example of an alphabetical key with same couplets
A. Seeds oblong go to—B B. Seeds white—northern beans B. Seeds black—black beans A. Seeds round—soybeans
(*Courtesy:* Constructing a Dichotomous Key, Theodore M. Sperry Herbarium, Department of Biology, Pittsburg State University, Pittsburg, Kansas 66762)

Features of Dichotomous Keys

- Keys in which the choices allow only two (mutually exclusive) alternative couplets are known as dichotomous keys
- Contrasting characters are chosen that divide the full set of possible species into smaller and smaller groups
- Statements typically begin with broad characteristics and become narrower as more choices are required
- Each time a choice is made, a number of species are eliminated from consideration

- *Eventually, after sufficient choices have been made, their range reduces to a single species and the identity of the unknown plant is revealed*

Types of Dichotomous Keys

There are *two types* of dichotomous keys. They differ in the method by which the couplets are organized and how the user is directed to successive choices.

Indented Keys (also called yoked)

- ✓ *Indents the choices (leads) of the couplet an equal distance from the left margin*

- ✓ *The two choices of the couplet are usually labelled 1 and 1' or la and lb*

- ✓ *It is not necessary that the choices are numbered, but it helps*

- ✓ *The user goes to the next indented couplet following the lead that was selected.*

Example of an Indented Key on *Rhododendron*

1a. Flowers in shades of red

2a. Flowers blood-red, leaves oblong-ovate, leathery and thick matty texture ..... *R. sikkimense*

2b. Flowers crimson-red, leaves broad, oval to elliptic oblong, shiny green above ..... *R. fulgens*

1b. Flowers in shades of rose-pink

3a. Calyx 3-5 mm long, leaf under surface covered with tufts of brown hair ..... *R. wallichii*

3b. Calyx obscure, 1-2 mm long, leaf under surface covered with continuous indumentum

4a. Corolla in shades of deep rose-pink flushed externally with red-purple, young leaves aeruginose, leaf margins inrolled ..... *R. aeruginosum*

4b. Corolla pale lavender blue, mauve or rose-purple, rarely white, young leaves not aeruginose, leaf margins not inrolled ..... *R. campanulatum*

Bracketed Keys

Provides both choices side-by-side. The choices of the couplet must be numbered (or lettered)

It is very helpful if the previous couplet is given

This key has exactly the same choices as the first example. The choices are separated, but it is easy to see the relationships.

While this key might be more difficult to construct, it gives more information to the user.

Example

(i) Fruit a group of achenes; flowers unspurred (2)
(i) Fruit a group of follicles; flowers spurred ……. (4)
(2) Petals absent…… (3)
(2) Petals present…… Ranunculus
(3) Sepals usually 4; involucre absent…… Clematis
(3) Sepals usually 5; involucre present…… Anemone
(4) Flowers regular; spurs 5…… Aquilagia
(4) Flowers irregular; spur 1 …… Delphinium

Example of a Bracketed Key on *Rhododendron*

1a.	Flowers in shades of red	go to 2
1b.	Flowers in shades of rose-pink	go to 3
2a.	Flowers blood-red, leaves oblong-ovate, leathery and thick matty texture	*R. sikkimense*
2b.	Flowers crimson red, leaves broad, oval to elliptic oblong, shiny green above	*R. fulgens*
3a.	Calyx 3-5 mm long, leaf under surface covered with tufts of brown hair	*R. wallichii*
3b.	Calyx obscure, 1-2 mm long, leaf under surface covered with continuous indumentum	go to 4
4a.	Corolla in shades of deep rose-pink flushed externally with red-purple, young leaves aeruginose, leaf margins inrolled	*R. aeruginosum*
4b.	Corolla pale lavender blue, mauve or rose-purple, rarely white, young leaves not aeruginose, leaf margins not inrolled	*R. campanulatum*

Comparison of Indented Key and Bracketed Key

	Indented Key	Bracketed Key
1	Each couplet has its 2 leads indented by the same amount from the left-hand margin of the page.	Each couplet has its 2 leads immediately adjacent under the same left-hand number.
2	The first couplet to be consulted is the one least indented and which has its first lead at the head of the key.	The first couplet to be consulted stands at the head of the key next to the number 1.
2	The next appropriate couplet to be consulted is the one with its first lead immediately below the chosen lead of the previous couplet, its leads being the next least indented pair below the latter.	The next appropriate couplet to be consulted is indicated by the reference number to further down the key, placed on the right-hand side of the chosen lead.

Problems using Dichotomous Keys

I. The key may not include all potential variations in the species

II. The key may rely on features not present in that season

*III. The key may not include "**all**" species of interest*

IV. One may misinterpret a feature or make a mistake

POLY CLAVE KEYS

- ✓ *The advantage of these keys is that they allow the user to enter the key at any point*

- ✓ *This key is based on the identification of organisms by a process of elimination*

- ✓ *In a written poly clave key there is a series of characters and character states*

- ✓Each state is followed by a number or code for the species that possess that feature

- ✓ The user needs to select any character and then copy down the list of species that possess the feature

- ✓Then the user has to select another character and eliminate any species that is not common to both lists.

Advantages of a poly clave (multiple-access) key are:

I. They are easy to use

II. They allow multi-entry i.e. the user can start anywhere

III. They are order-free i.e. the user can work in any direction with any character.

IV. They are faster.

V. They are easily computerized

Suggestions to use a Poly clave Key:

I. *Read through the list of characters to become familiar with the possibilities.*

II. Scan the list to find a character with a state that you observe in your specimen.

III. Start with a readily identifiable character that has only a few numbers (taxa) associated with it.

IV. Write a brief description of the character and state and the numbers of the taxa that can be described by this state.

V. Choose another character and state that describes your taxa

VI. Continue this process until just one taxon remains for all of the states

VII. Read the name of the taxon after its number in the list of taxa

The polyclaves types are

(a) *Cards with holes commonly referred to as "peck-a-boo" or "window" cards*

(b) Edge-punched or "key sort" cards

(c) Semi-transparent overlays.