

PLANT CLASSIFICATION



PLANT CLASSIFICATION

-a means of grouping plants according to their similarities



WHAT IS A PLANT?

- Invention of the microscope revealed organisms, neither animals nor plants, with qualities of both.
- The simple two-kingdom model of life was replaced by three domains: *Eukarya*, *Bacteria*, and *Archaea*.
 - Plants fall within the Eukarya domain.
 - There is no universally accepted definition of what a plant is.

Definition of a Plant

- ▣ Plants are defined as eukaryotes that have cell walls containing cellulose and carry out photosynthesis using chlorophyll.
 - Most all plants are multi-cellular and are autotrophs (make their own food).
 - A few plants are parasites.
 - Plants develop from developed embryos.

Vascular Plants

- Understanding how plants grow and develop helps us capitalize on their usefulness and make them part of our everyday lives.
- In horticulture we tend to focus on vascular plants
 - Vascular plants are those that contain water- and nutrient-conducting tissues called xylem and phloem
 - Ferns and seed-producing plants fall into this category
- Non-vascular plants must rely on each cell directly absorbing the nutrients that they need.
- Often these plants are found in water in order to make this possible.
- Only vascular plants are capable of large production capacities on dry land.

How many plants are there?

- About 350,000 plants are known to exist, and new ones are still being discovered.
- ◉ As of 2004, scientists have named 287,655 plants.
 - 258,650 flowering plants.
 - The rest are mosses, ferns, and green algae.
- ◉ Plants occupy most of the earth's surface, and are also found in both fresh and marine systems.
 - For purposes of this class and our text, the term *plant* will refer to a land plant.

Plant Classifications

▣ Botanical

- Identifies plants according to their physical characteristics

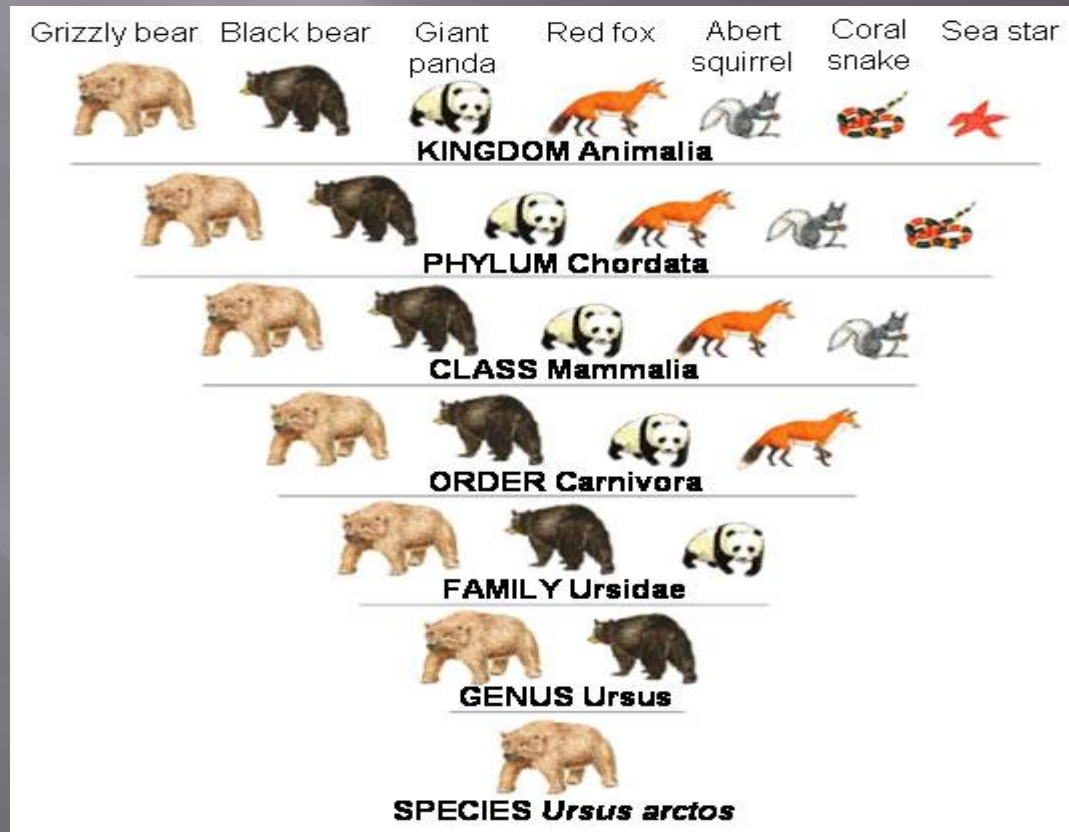
Plant Classifications

▣ Descriptive

- System that identifies plants by their use and life cycle

Botanical System of Classification

7 Categories



Botanical System of Classification

- ▣ 1. Kingdom (six kingdoms)
 - ▣ Can you name them?
- ▣ 2. Division or Phylum
- ▣ 3. Class
 - Subclass

Botanical System of Classification

- ▣ 4. Order
- ▣ 5. Family
- ▣ 6. Genus
- ▣ 7. Species

Binomial Nomenclature

Botanical nomenclature is the orderly classification and naming of plants.

The botanical naming system is not overly complex, and it does not require any background in Latin.

A number of common names are the same as botanical names, such as iris, fuchsia, and citrus.

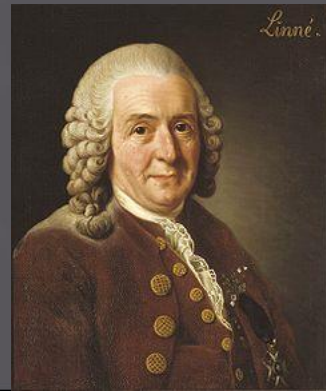
The requirement for both a genus and a specific epithet to name a species is what defines the system as “binomial”

Derived from Latin *bi* = 2; *nomin* = name.

PLANT NOMENCLATURE AND CLASSIFICATION

The Origin and Construction of Botanical Names

- ▣ The branch of botany that deals with the naming of plants is called *taxonomy*.
 - People doing the work are *taxonomists*.
- ▣ The naming system used dates back 250 years to the Swedish botanist Carolus Linnaeus.
 - Who named and published the first references to many plants using a naming method called the binomial system.



PLANT NOMENCLATURE AND CLASSIFICATION

The Origin and Construction of Botanical Names

- The binomial system specifies that a plant name must have at least two parts.
- In the botanical name for the French marigold, *Tagetes patula*:
 - *Tagetes* is called the **genus** (genera, plural).
 - *patula* is called the specific **epithet**.
 - When combined, these two words form the plant species.



PLANT NOMENCLATURE AND CLASSIFICATION

Botanical Classification of Plants

- ▣ The classification of plants leads ultimately to the smallest division, variety, or cultivar.
- Each family groups a number of genera having like characteristics together.
 - These families have both Latin & common names.

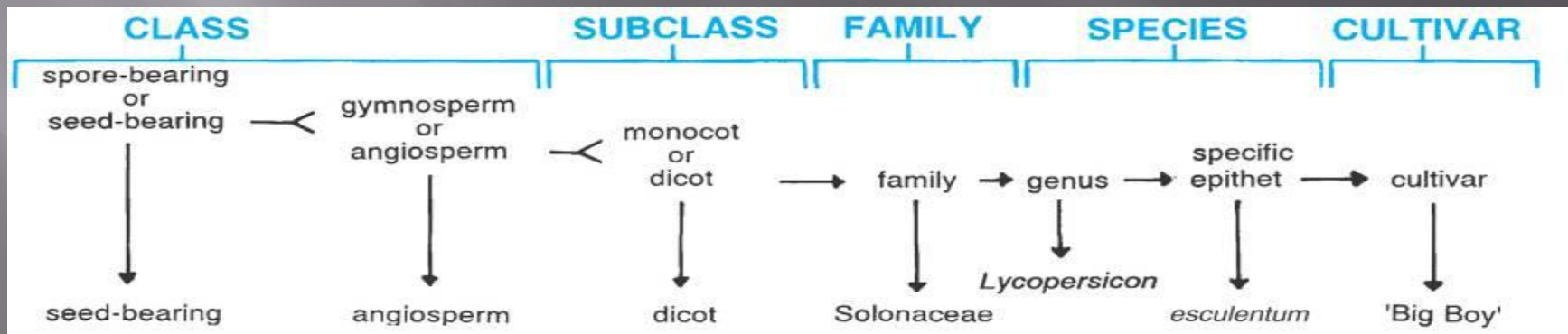


 Figure 2-2 A botanical classification of the tomato cultivar 'Big Boy.'

Varieties and Cultivars

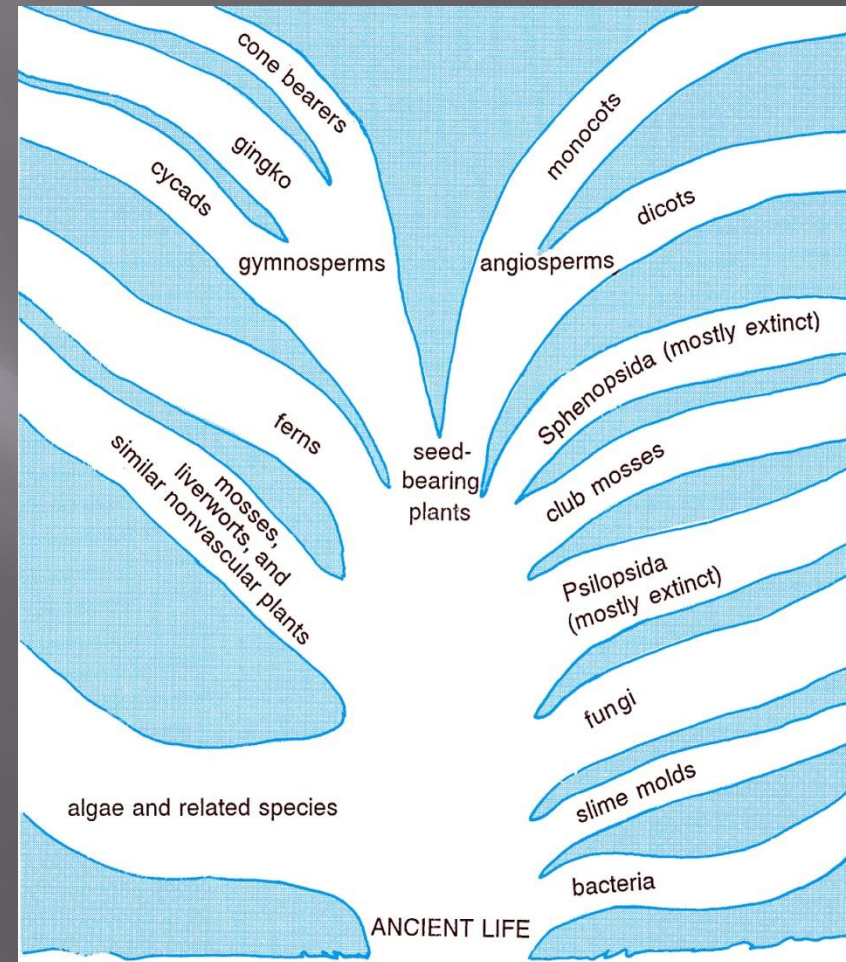
- ▣ A plant variety is a naturally occurring mutation or offspring different significantly from the parent.
 - A species with white flowers might spontaneously mutate and a new variety with pink flowers would appear.
- ▣ A cultivar is human-made and/or -maintained.
 - The name is short for “cultivated variety”.

Botanical System of Classification

- ▣ Most names are in Latin.
- ▣ Why do we need this?
 - Clearly ID's plants
 - Universal language
 - Slow to change

Plant Groups

- Ninety percent of cultivated plants have flowers, reproducing by seed.
 - A few of the commonly grown ones do not.
- Ferns, the most widely known *Pteridophytes*, emerged early in plant evolution.
- They have a reproductive system based on spores



All other plants are put into two main categories:



Gymnosperms

Includes evergreen cone-bearing plants like pines, spruces, junipers and yews.

Foliage generally is needlelike, and they do not have flowers or juicy fruits.



Angiosperms

All flowering plants & nearly all food plants.

Primary identifying characteristic is the flower, which includes a plant ovary, which swells to become the fruit with seeds inside.

Angiosperms are divided into two other groups.

▣ Monocots and Dicots



What is a cotyledon?

- A *cotyledon* is the fleshy structure within a seed that contains food for a developing embryo.
- It is also the first seed leaves to appear as the seed germinates. Also known as seed leaves.



- Whether a plant is a monocot or dicot can help determine its method of propagation and susceptibility to weed killers.



Monocots

- ▣ 1 cotyledon in a seed
- ▣ Leaves with parallel veins
- ▣ Vascular bundles scattered throughout
- ▣ Don't produce wood

Monocots

- ▣ Root System composed of many fibrous roots with many hairs
- ▣ Flower parts in 3's

Monocots

MONOCOTS

Cotyledons



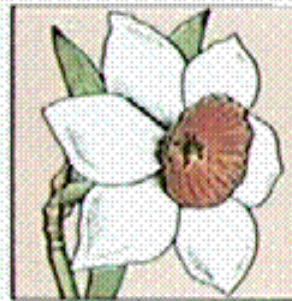
One cotyledon

Veins in leaves



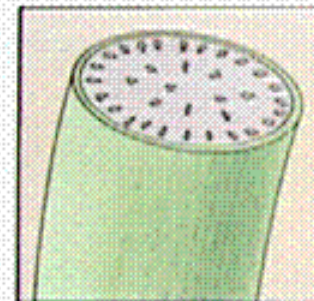
Usually Parallel

Flower parts



Usually in multiples of three

Arrangement of primary vascular bundles in stem



Scattered

Dicots

- ▣ Seeds with 2 seed leaves or 2 cotyledons
- ▣ Veins are “webbed or net.”
- ▣ Pollen with three furrows or pores.
- ▣ Flowers parts in multiples of four or five.
- ▣ Stem vascular bundles in a ring.
- ▣ Root system composed of primary tap root and many hairs



Dicot Leaf

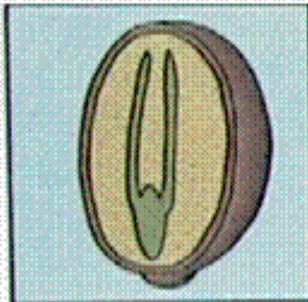


Dicot

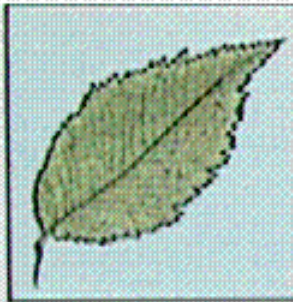


DICOTS

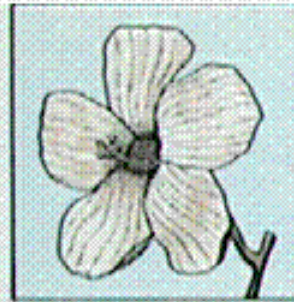
Two cotyledons



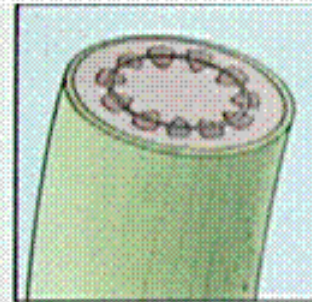
Usually netlike



Usually in fours or fives



In a ring



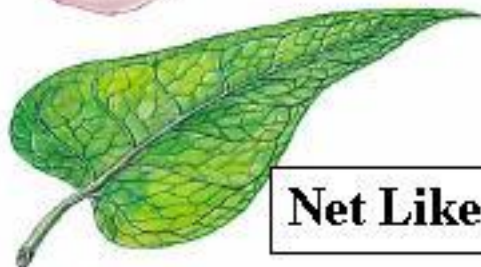
Dicots vs Monocots



Two Cotyledons



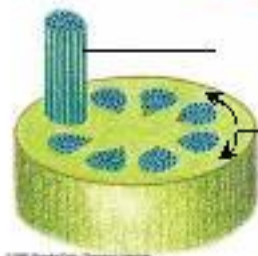
4x or 5x Floral Parts



Net Like Veins



3 Pores in Pollen



Bundled Vasculature

Dicots



One Cotyledon



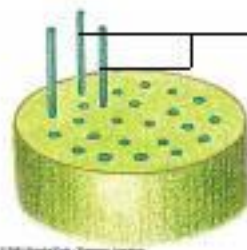
3x Floral Parts



Parallel Veins



1 Pore in Pollen



Dispersed Vasculature

Monocots

Fig 29.10

Monocots and Dicots

▣ Monocots

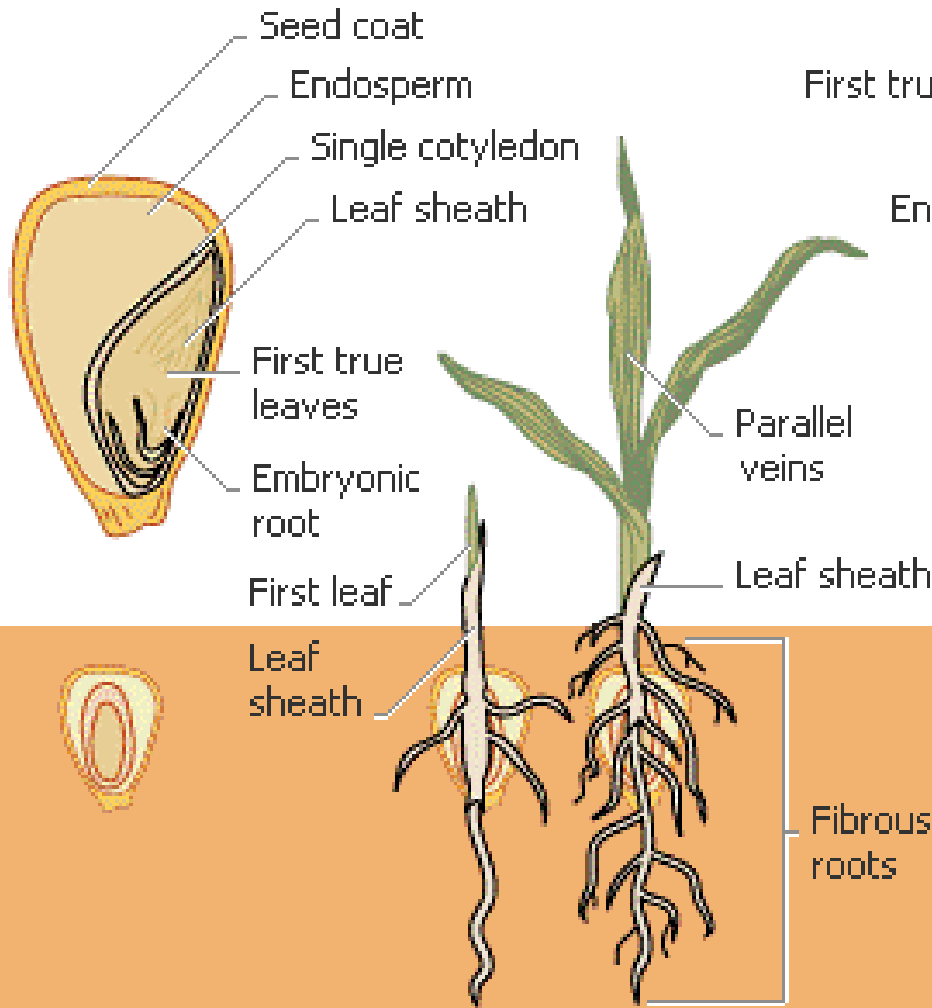
- 1- One cotyledon
- 2- Leaves-parallel venation
- 3- Stems-vascular bundles scattered throughout the stem
- 4- Flower parts in multiples of 3
- 5- Fibrous root system

▣ Dicots

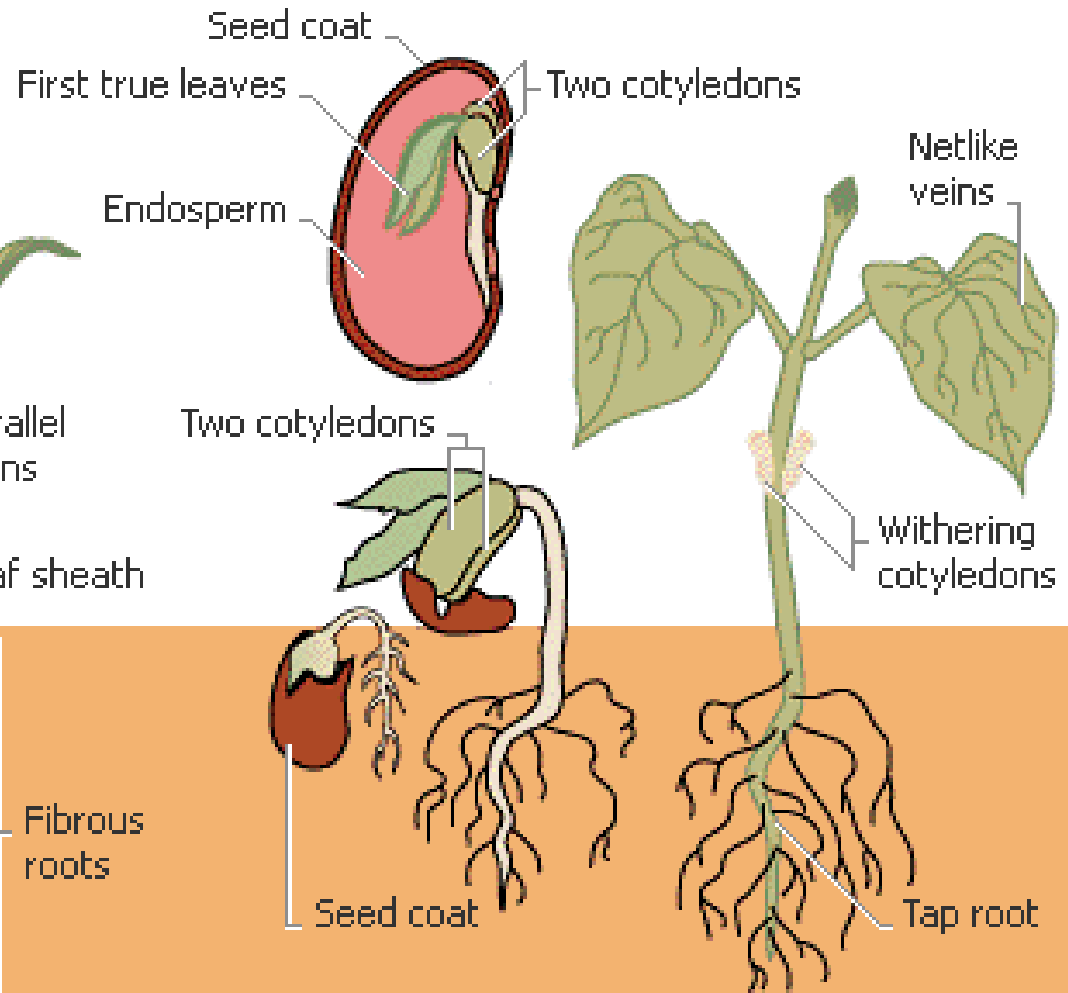
- 1- Two cotyledons
- 2- Leaves-netted venation
- 3- Stems-bundles arranged in a ring
- 4- Flower parts in multiples of 4 or 5
- 5- Taproot system

Monocots vs. Dicots

Monocotyledon (corn)



Dicotyledon (bean)



Plant Life Cycles

Purple foxglove- *Digitalis Purpurea*



Lettuce- *Lactuca sativa*



Redwood- *Sequoiadendron
sempervirens*



Marigold- *Calendula officinalis*



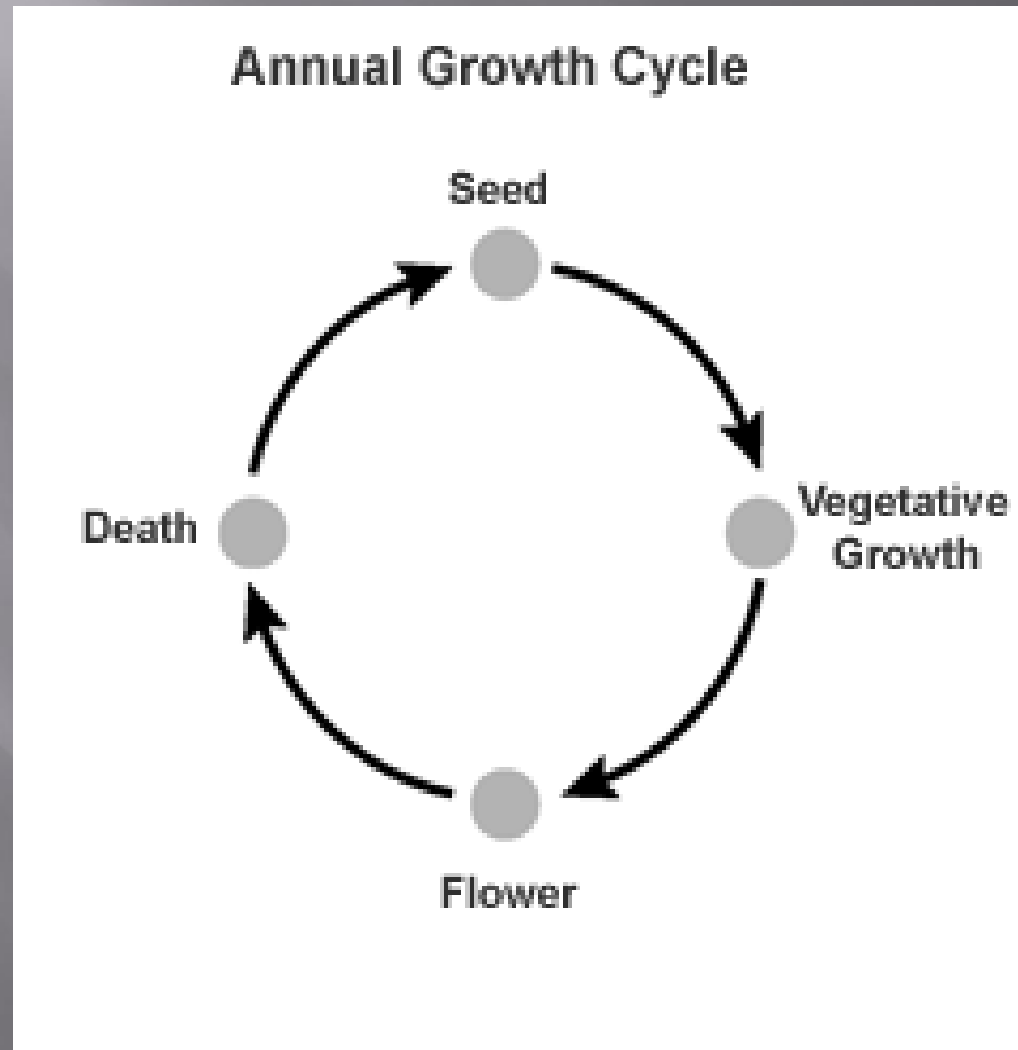
Vinca- *Vinca Minor*

Plant Life Cycles

Annuals

- Based on its life cycle, a plant is classified as an annual, biennial, or perennial.
- An **annual**, such as a zinnia, completes its life cycle in 1 year.
- Annuals are said to go from seed to seed in 1 year or growing season.
 - During this period, they grow, mature, bloom, produce seeds, and die.
- There are both winter and summer annual weeds, and understanding a weed's life cycle is important in controlling it.
 - Summer annuals complete their life cycle during spring and summer
 - Most winter annuals complete their growing season during fall and winter.

Annual Growth Cycle

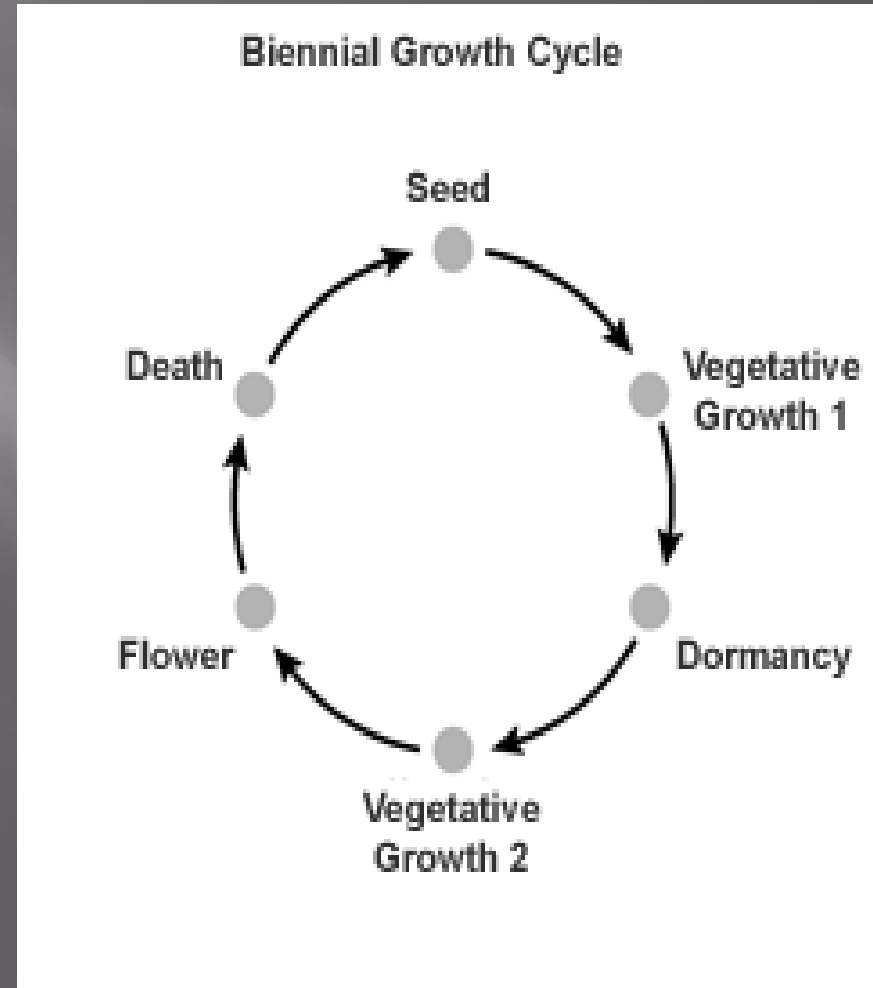


Biennial

- ◉ A **biennial** requires all or part of 2 years to complete its life cycle.
- ◉ During the first season, it produces vegetative structures (leaves) and food storage organs.
- ◉ The plant overwinters and then produces flowers, fruit, and seeds during its second season.
- ◉ Swiss chard, carrots, beets, Sweet William, and parsley are examples of biennials.

Biennial Growth Cycle

- Sometimes biennials go from seed germination to seed production in only one growing season.
- This situation occurs when extreme environmental conditions (e.g. drought or temperature variation)
 - A plant will pass rapidly through the equivalent of two growing seasons.
 - This phenomenon is referred to as bolting.
 - Sometimes bolting occurs when biennial plant starts are exposed to a cold spell before being planted in the garden.

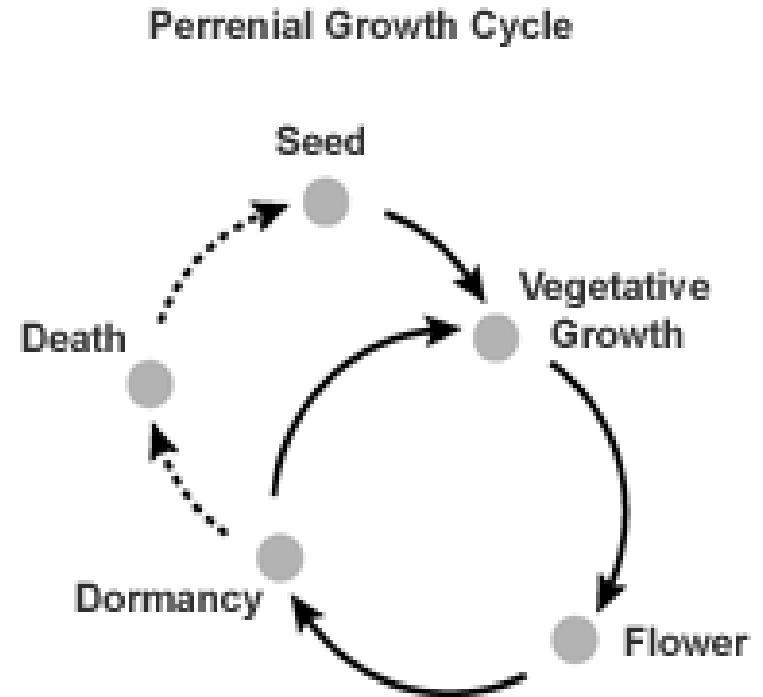


Perennials

- Perennial plants live more than 2 years
- They are grouped into two categories: herbaceous perennials and woody perennials.
- **Herbaceous perennials** have soft, non-woody stems that generally die back to the ground each winter.
 - New stems grow from the plant's crown each spring.
- Trees and shrubs, on the other hand, have woody stems that withstand cold winter temperatures.
 - They are referred to as **woody perennials**.

Perennial Life Cycle

- In a perennial life cycle, seed production can occur every year or every other year.
- Pruning may be necessary in some perennials (particularly fruit trees and berries) in order to have annual production.



Annuals, biennials, perennials

- ▣ Annuals – complete their life cycle in one season.

Examples: Marigold, Petunias, and many more!



Life Cycles

- ▣ Summer Annuals
 - Planted in spring, harvested in fall
- ▣ Winter Annuals
 - Planted in fall, harvested in following summer

Biennials -complete their life cycle in two seasons. (first season vegetative growth, second season reproduce)

- ▣ Examples: Holly Hocks, Fox Glove



Perennials

▣ Plants that grow year after year.

Examples: Roses, Shasta Daisy



Legumes

- ▣ A family of plants whose seeds are formed in fruit and the fruits are formed in pods
- ▣ Have ability to take N from the air because of rhizobia bacteria on their roots.



Common Legume Plants

- ▣ Beans, including soybean
- ▣ Alfalfa
- ▣ Clovers
- ▣ Peas