Master Gardener Program

Utah State University
Cooperative Extension
Plant Parts and Functions
Overview

- Plant Classification
- Stems
- Buds
- Leaves
- Flowers
- Fruits
- Roots
Plant Classifications

- Woody vs. Herbaceous
- Deciduous vs. Evergreen
- Annual vs. Perennial vs. Biennial
- Gymnosperms vs. Angiosperms
- Monocots vs. Dicots
- Botanical, Scientific (Latin) Name
Herbaceous vs. Woody

- Woody – plants that develop woody stems
- Herbaceous – soft green plants that have little or no woody tissue
Deciduous vs. Evergreen

- Deciduous
  - Loose their leaves annually
- Evergreen
  - Retain leaves during the winter
Annual, Perennial, Biennial

- **Annual** – completes life cycle in one year (seed to seed)
- **Perennial** – plant lives through the winter to grow from same roots the following year
- **Biennial** – takes two years to complete the life cycle. Stores energy in roots then flowers after cold of winter
Gymnosperms, Angiosperms

- Gymnosperms – cone bearers
- Angiosperms – seeds inside fruit
  - Dicots and Monocots
Monocots, Dicots, Polycots

- Monocots – grasses
- Dicots – broadleafs
Germination

GERMINATION OF A DICOT
Stages in germination of garden bean

GERMINATION OF A MONOCOT (Grasses)
Seed germination. (Left): corn. (Right): onion
Scientific Names

- Binomial nomenclature system devised by Carl Linnaeus (1707-1778)
- Species are uniquely identified by name
  - Many species have more than one common name
  - Multiple species may share a common name
- Species names consist of:
  Genus + specific epithet
Species Names

Genus + specific epithet

- “Genus” groups plants that are genetically related, have similar characteristics.
  - Acer = MAPLE, BOX ELDER
- “specific epithet” identifies unique plants within a genus, usually an adjective.
  - Acer palmatum = JAPANESE MAPLE, palmatum implies radiation from a single point – leaflets or veins
Cultivar, Variety, Cross

- **Cultivar** – a variant of a species whose characteristics reproduced vegetatively
  - Acer palmatum `Garnet’

- **Variety** – a naturally occurring variant of a wild species. Propagated by seed.
  - Gleditsia triacanthos var. inermis – thornless honeylocust.
  - Cross – characteristics created by crossing species Caryopteris X Clandonensis
Propagation

- Sexual – seed
- Vegetative – plant parts
  - Division
  - Plantlets
  - Root and stem cuttings
  - Grafting and Budding
  - Air layering
  - Tissue culture (micropropagation)
Vascular System

- **Phloem** – outside cambium
  - transport sugars to roots
- **Xylem** – inside cambium
  - water and nutrients from roots
- **Pith**
  - heartwood, dead tissue
- **Cambium** – single cell layer
  - Separates xylem and phloem
- **Wounds**
  - Shallow destroy phloem
- **Node**
  - Area on stem where a leaf may emerge

- **Internode**
  - Relatively inactive area between nodes
  - Length varies depending on plant vigor, conditions, species

- **Compressed stems** – short internodes

- **Elongated stems** – longer internodes
Types of Stems

- Above ground stems
  - Crowns
  - Spurs
  - Stolons
- Below ground stems
  - Tubers
  - Rhizomes
  - Bulbs
  - Corms
A crown is a compressed stem.
A spur is a compressed stem of a woody plant that is adapted to fruit production.
A stolon or runner is an elongated stem that lies along the ground. It may root at any node along the stem.
A tuber is a thick fleshy root which acts as a storage organ.

The eyes of potatoes are the nodes on the potato tuber.
Rhizomes

- A rhizome is an underground horizontal stem from which roots and shoots develop.
A bulb is an underground storage organ containing an embryonic plant. It is made up of a short stem and fleshy leaves.
A corm is an underground storage organ made up of a compressed and thickened stem covered with a thin papery skin.
Buds

- New stems, flowers, or leaves arising at a node.
- Flower/fruit buds often have a critical winter time and temperature rest requirement before they will bloom.
  - Forsythia (minimal requirement)
  - Peaches 700-1000 hrs below 45°F
  - Cherries 900-1100 hrs below 45°F
- Buds are hardy until the rest period is broken after which they are susceptible to frost.
- Food source – broccoli, artichoke
Types of Buds

- Latent – buds that are present but inactive. Often suppressed by hormones from the terminal bud.
- Lateral – branching point for side stems and base of the petiole.
- Terminal – growth point, bud at end of stem.
- Adventitious – buds at points other than nodes. Water sprouts and suckers.
- Petiole - stem like appendage
- Petiolate - leaf without petiole
- Principal function - photosynthesis
Leaf Anatomy

- Epidermis – outer covering
- Cuticle – protects leaf from dehydration
- Stomates – open and close for gas transport
- Guard Cells – control the opening and closing of the stomates.
Leaves for Identification

- Leaf shapes contribute to plant ID
  - Leaf type
  - Leaf shape
  - Arrangement
  - Margins
  - Veination
  - Gymnosperm leaf types
Leaf Types

Simple
Palmate Compound
Pinnate Compound
Double Pinnate Compound

Compound pinnate may be odd or even.
Gymnosperm Leaf Types

Awl-like

Scale-like

Needle-like
Leaf Shapes

Lanceolate  Linear  Cordate  Elliptical  Ovate
More on Leaf Shapes

Apex shapes
- Acute
- Acuminate
- Obtuse

Base shapes
- Cuneate
- Obtuse
- Cordate
Arrangement

- Rosette
- Alternate
- Opposite
- Whorled
Leaf Margins

Entire  Crenate  Dentate  Serrate  Incised  Lobed
Veination

Parallel

Pinnate

Palmate
- Sepals - calyx
- Petals - corolla
- Pistil
- Stamen
- Monoecious
- Dioecious
Flower Processes

- Pollination
- Germination
- Fertilization
- Fruit Development
Pollination

Pollination is the transfer of pollen from the anther to the stigma.

- Cross pollination
  - Wind
  - Water
  - Birds
  - Insects
- Self pollination
Germination
Fertilization

1. Pollen lands on stigma and germinates
2. Pollen tube grows through the style
3. Tube delivers sperm to the egg
Fruit Development

- Flower parts shrivel and drop except for ovary
- Ovary develops to swollen fruit with seeds
- Fleshy fruits – apples, cucumbers
- Dry fruits – pinecones, pea pods
Types of Fruits

- Simple – single ovary
  - apples, tomatoes
- Aggregate – single flower, many ovaries
  - strawberries
- Multiple – tight clusters of separate flowers
  - pineapples, figs
Seeds

- Have built in food supply
- Germinate when dormancy is broken
  - Water
  - Temperature, hot or cold, moist
  - Scratched, nicked seed coat
  - Light or dark
Root Anatomy

- Root hairs
- Root cap
- Zones
  - Maturation
  - Elongation
  - Meristematic
Types of Roots

- Taproot
- Fibrous
- Root hairs
- Mycorrhizae
Taproot

- Prominent root with few branches
- Sometimes swollen to store food
Composed of
- Many branching rootlets
- Many lateral rootlets
- Usually lacks a taproot
Root Hairs

- Hair like projections of a root’s epidermal cell
- Extends the surface area of a root
Mycorrhizae

- The symbiotic relationship between certain soil fungi and roots

- **Fungi**
  - Enter the root tissue
  - Extend absorption area into soil
  - Provide added nutrients (P and N)
  - Receive carbohydrates from the plant
Summary

- Plant Classification
- Stems
- Buds
- Leaves
- Flowers
- Fruits
- Roots