

PLANT STRUCTURES

Root Types

- Tap roots
 - Carrots, beets
- Fibrous roots
 - Grains

Roots

Functions

- Absorb water and minerals
- Anchor plant to soil
- Reduce soil erosion
- Food source
- Medicines

Stem Functions

- Transport
 - Xylem (water and minerals)
 - Phloem (sugars and organic molecules)
- Support
 - Xylem
- Food storage
- Medicines & psychoactives

Stem Structures

- Xylem
 - Support and transport (wood, paper, rope)
- Phloem
 - Transport (sap, latex, maple syrup)
- Vascular cambium
 - Production of new xylem and phloem cells

Stems as food

Stems as Food Storage

Tubers
(spherical underground storage stems) potatoes

Rhizomes
(swollen horizontal storage) ginger

Corms
(vertical stems)
Crocus, taro

Leaf Functions

- Photosynthetic organ
- Transpiration
 - Driving force for water movement
- Food (spinach, lettuce)
- Food storage
 - Bulbs
- Herbs, tea, medicines, and psychoactives

Leaves as Food

Leaves as Food Storage

- Bulbs

PLANT REPRODUCTION

Plant Reproduction

Asexual reproduction (clones)

- Vegetative propagation
 - Leaves, stems, rhizomes, tubers
 - Crop uniformity
 - More efficient than seeds

Plant Reproduction

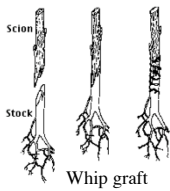
- Asexual reproduction (clones)
- Vegetative propagation - runners

Plant Reproduction

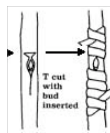
- Asexual reproduction (clones)
- Vegetative propagation - cuttings

Plant Reproduction

- Asexual reproduction (clones)
- Vegetative propagation - grafts



Whip graft

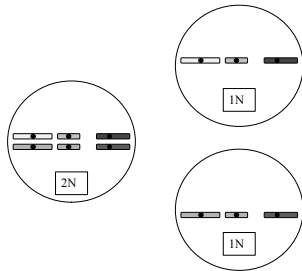


Bud graft

Plant Reproduction

- Sexual reproduction
 - Meiosis
 - Reduction division (diploid to haploid)
 - Increases genetic variations (new varieties)
 - Quality of new variety is unknown
 - Sperm and egg production

Meiosis



Plant Reproduction

- Hass Avocado sexual and asexual reproduction
 - Hass bought young tree from R. W. Rideout - 1920's
 - Rudolph Hass - patent 1935

Meiosis

- Non-disjunction
 - The chromosomes do not separate at anaphase I or anaphase II
 - Polyploidy
 - Colchicine (from corm of crocus)

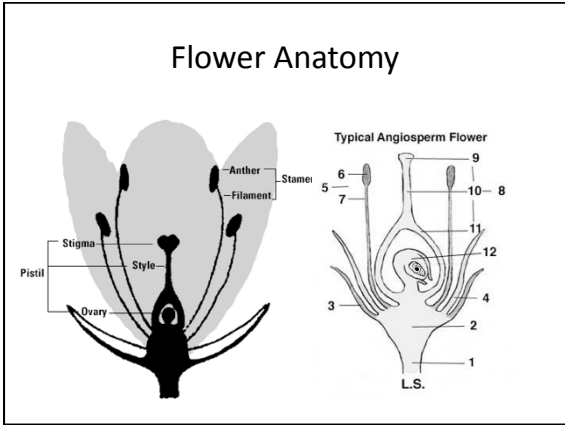
Flowers - Reproductive Organs

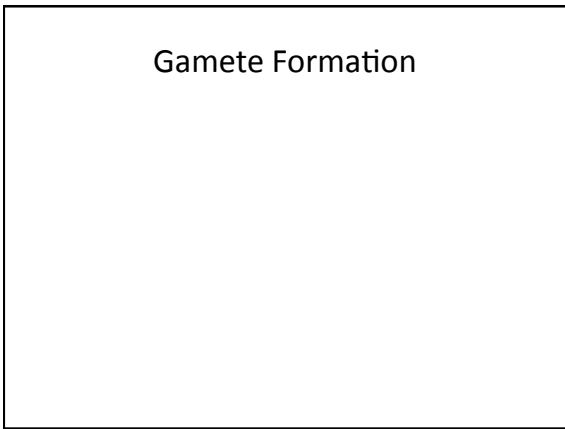
Flower Functions

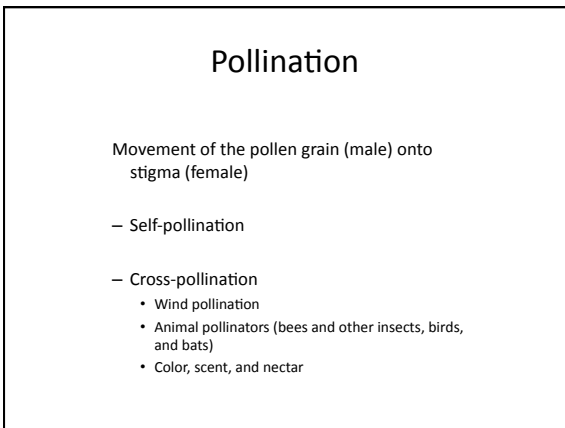
- Gametophyte production (meiosis)
 - Gamete (sperm and egg) formation
- Pollination
- Fertilization
- Fruit and seed production

Flower Anatomy

- Male
 - Stamens (anthers and filaments)
 - Produce pollen that contains sperm nucleus
- Female
 - Pistil (stigma, style and ovary)
 - Ovary contains the ovule
 - Ovule contains the egg and the polar nuclei (future embryo and endosperm)







Fertilization

- The joining of the sperm nucleus with the egg to produce the zygote.

Flower Types

- Perfect flowers
 - Both male and female components
- Imperfect flowers
 - Have either male or female parts (staminate and pistillate flowers)

Flower Types

Imperfect flowers

- Monoecious plants
 - Separate male and female flowers on the same plant (walnut and squash)
- Dioecious plants
 - Male flowers are on one plant and female flowers on a different plant (carob trees, jojoba plant, and cannabis)

Seeds

Functions of seeds

- Development of a new plant
 - Embryo
- Food storage
 - Endosperm or cotyledons

Seed Germination

- Growth of the embryo using food storage
- Water, scarification, smoke, sunlight etc.

Fruit

Functions of fruit

- Surrounds the seed
- Seed protection
- Seed dispersion
 - Water, wind, animals

Types of Fruit

- Fleshy fruits
 - Invite consumption. Seeds travel in or on the animal.
- Dry fruits
 - Appendages that catch wind, animals, or water for dispersal

Fleshy Fruit

Dry Fruit

Fruit Ripening (hormones)

- Auxins
 - Produce fruit without seeds (tomato and cucumber)
 - Low doses prevent fruit drop
 - High concentration activate fruit drop (apples, oranges)
- Gibberellins.
 - Increase the size of seedless grapes and stimulate barley seed germination
- Cytokinins
 - Slows down death used to prolong length of cut flowers.

Fruit Ripening (hormones)

- Ethylene gas
 - Promotes flowering in pineapple
 - Stimulates fruit ripening (starch to sugar) apples, oranges, tomatoes, bananas, avocados. Pick green, store, apply ethylene to ripen.

Flowers and Fruit

| FLOWER STRUCTURE | FRUIT STRUCTURE |
|------------------|----------------------|
| ovary | fruit (pericarp) |
| ovule | seed |
| zygote | embryo (in the seed) |
