# **Plants - Chapters 33-38**

**Bryophyta(non vascular)**

Mosses

Liverworts

**Tracheophyta (vascular)**

Pterophyta (ferns)

Gymnosperms (naked seed plant)

Angiosperms (enclosed seed plant)Monocotyledons & Dicotyledons

# **Life Cycles**

Alternation of Generation

Sporophyte

Gametophyte

Haploid vs Diploid

Sexual vs Asexual

Antheridia (Mosses/Liverworts/Ferns)

Archegonia (mosses/liverworts/ferns)

Spores & structures that from them

Seed (gymnosperms & angiosperms)

Microspores (pollen grain) / Megaspores (ovule)

Egg Nucleus & 2polar nuclei

pollination & pollinators

pollen cone vs seed cone

flower carpel (stigma, style, ovary)

flower stamen (anther, filament)

petals, sepals, receptacle

fruit

# **Adaptation to Land**

cuticle

stoma

true root systems

increased dominance of diploid sporophyte

decreasing dependency on water for fertilization

vascular tissues

lignin in cell walls

Plant Anatomy - Tissues

meristematic (perpetual embryonc tissue)

apical meristems (tips and buds - primary growth)

lateral meristem (cambium - secondary growth)

**vascular**

xylem (water & minerals up - tracheids/vessel elements)

phloem (carbohydrates down - sieve tubes / companion cells)

annual rings (spring vs summer wood / heart vs sap wood)

bark

annuals

biennials

perrenials

**dermal**

stoma & lenticels

trichomes

cuticle

root hairs

**ground**

parenchyma (no secondary cell wall / plastids & types)

collenchyma

sclerenchyma

# **Organs**

Leaves - food making, protection

(stoma, dermis, palisade parenchyma, spongy parenchyma, vein)

Stem - transport, support, storage

(vascular bundles, pith, cortex)

Root - absorption of water & minerals, storage, anchor

(fibrous vs tap, cortex, steele, endodermis, casparian strip, root hairs, adventitious roots)

Reproductive Organs (Flowers / Cones)

# **Physiology**

Transport - Xylem (water & minerals up)

Root Pressure (active transport of solutes in, retaining high souktes outside the steele, root hairs absorbing large volumes of water)

Transpiration Cohesion - capilary action of water in tubes of small diameter, cohesion between water molecules, transpiration pull from surface of leaves)

Rate of upward movement influenced by rate of transpiration

Conditions affecting transpiration?

Transport - Phloem (carbohydrates amino acids, hormones down)

Source to Sink Translocation

Primarily down (When might it go up?)

sucrose actively transported from parenchyma of leaves into sieve tubes of veins

parenchyma cells at the sink actively transport sucrose out of phloem

hydrostatic pressure exists at both ends encouraging "Bulk Flow"

# **Nutrition**

Clay vs Gravel vs Loam

fertilizers, irrigation, erosion control

Essential Nutrients (Macro vs Micronutrients)

Nitrogen - nitrogen cycle directed by bacteria

nitrogen fixation (N2->NH3)

nitrification (NH3->NO3)

ammonification (protein->NH3)

denitrification (NO3->N2)

Assimilation (plant protein ->animal protein)

Mycorrhizae - fugus associates with root systems of most trees. retains water, secretes chemicals that enhances mineral absorption, protects form certain pathogens. Plant provides sugar to fungus (mutualistic)

Root Nodules in legumes (roots secrete chemical that attracts nitrogen fixing bacteria. The root forms an "infection thread" - a modified root hair- that allows the bacteria to enter to the cortex. Bacteria produce a chemical that stimulates rapid cell division and forms a nodule)

Phosphates, Carbon, Hydrogen, Oxygen

magnesium - chlorophyl

sulfur - amino acids

iron - cytochromes in ETC of mitochondria & photosystems

potasium - osmotic regulation

# **Reproduction**

Seed - seed coat, endosperm, embryo plant

adaptive advantages - germination only during ideal cond.

when seed coat splits water is absorbed initiating enzymatic breakdown of food reserves inducing growth of plant

Natural Asexual by vegetative propagation

Aertficial - cuttings, graphting, clones

Clones (totipotent cells under ideal concentrations of hormones

# **Hormonal Control**

Auxins- promotes elongation of cells. Concentration will determine impact on cells - comes from apical meristems - inhibits lateral growth (2,4-D synthetic auxin acts as a weed killer - effects dicots only causing them to elongate to death)

Cytokinins - stimulate cytokinesis. concentration will determine impact on cells. Cytokinins & Auxins work together to control growth and differentiation More auxins than cytokinin = more root growth, more cytokinin that auxin = more stem growth

Gibberellins - stimulate growth in leaves and stems no effect on roots - produced by roots and young leaves - encourage rapid elongation & enlarging (bolting)

Abscisic Acid - inhibits primary & secondary growth (dormancy) - produced by roots & stems

Ethylene - gaseous hormone acts as a growth inhibitor induces aging (fruit ripening, abscision layer & leaf drop)

Tropism - environment influences hormone concentration which induces growth response.

(Phototropism, Gravitropism, Thigmotropism)

Turgor Movements (guard cells, fly trap, sensitive mimosa)

Photoperiodism -

Pr (red absorbing phytochrome)

Pfr (far red absorbing phytochrome)

Plants make Pr which gets converted to Pfr when exposed to light

Pfr gets coverted to Pr during night

When concentration of Pfr reaches critical level it will induce change (flowering, germination, induces dormancy)

Long Day vs Short day vs Day Neutral Plants