Nutrition in Plants

▼ External:

1. Lamina
    - large and flat: Obtain max amt of light
    - thin: CO_2 can reach inner cells at faster rate
2. Veins (mid-rib and branch vein)
    - Carry water and mineral salts to leaves
    - manufactured food to other parts of plant
3. Petiole
    - Hold leaf away from stem
        - obtain sunlight and air

▼ Internal:

▼ **<u>Upper Epidermis</u>**

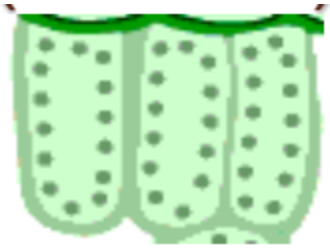
- Single layer of cells
- no chloroplasts
- Covered by waxy cuticle which:
    - Protect leaf tissue
    - Prevent excessive evaporation of water

▼ Mesophyll

Mesophyll (two kinds: Palisade mesophyll and Spongy mesophyll)

- Main site for photosynthesis

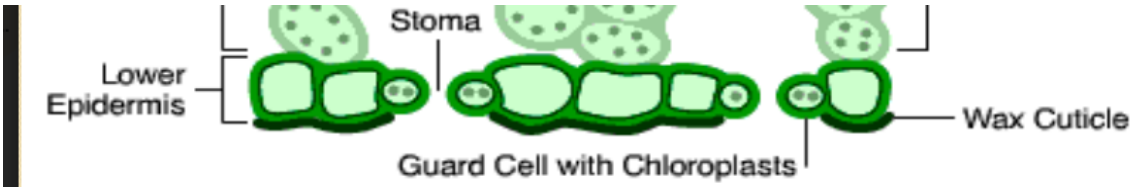
- **Palisade mesophyll**



  - 1-2 layers
  - closely packed, elongated cells
  - has most chloroplasts → enable them to absorb maximum sunlight for photosynthesis
- **Spongy mesophyll**

  - cells are irregularly shaped
  - less chloroplasts
  - Contain numerous large intercellular air spaces
  - rapid diffusion of gases thru leaf
- Covered in thin film of moisture
  - so that co2 can dissolve in it
- phloem and xylem found

▼ Lower Epidermis



- same as upper but, with guard cells and stomata
  - guard cells: control size of stomata
  - Stomata: allow for gaseous exchange

Stomata:

OPEN:

- open in day and close in night
- guard cells got chloroplasts
- photosynthesis in day
- become concentrated inside
- WP (water potential) decrease
- water enter guard cells
- cell become turgid and bean-shaped
- stoma open

CLOSE:

- carbohydrate made during the day diffuses out of leaf
- WP increase
- water leave guard cells
- guard cells become flaccid
- stoma close

Photosynthesis:

Define:

- light energy absorbed by chlorophyll
    - converted into chemical energy
- energy used to synthesize glucose from water and co2
- o2 gas released in process
- **Carbon dioxide + Water → Glucose + Oxygen + Water**

  (arrow consist of sunlight and chlorophyll)
- photo(light) synthesis(put tgt)

What happens to the glucose produced from photosynthesis?

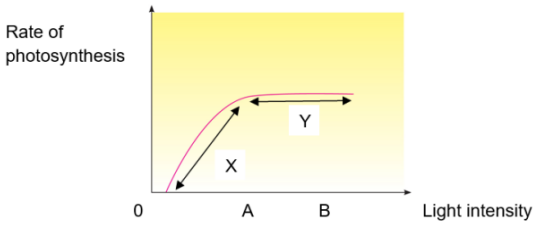
- broken down by cells during cellular respiration to provide energy for cellular activities
- make cellulose cell walls
- form fats
- react with nitrate → form amino acids
- converted into sucrose → translocated away
- converted to starch during the day
- starch converted back to glucose

Limiting Factors

Define: ANY factor that directly affect process if quantity is changed

Factors of photosynthesis?

1. Light Intensity
2. Carbon dioxide concentration
3. Temperature



At X: as light Intensity increase, rate of photosynthesis increase

At Y: rate of photosynthesis remains constant. Light Intensity no longer limiting factor, could be either temperature or carbon dioxide conc

How to increase rate of photosynthesis: increase co2 conc or temperature till optimum