Chapter – 1: Nutrition in Plants

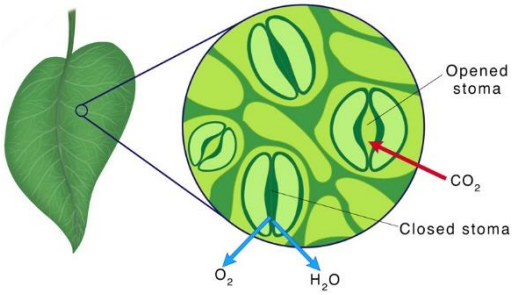
- Food – essential for all living beings
- Carbohydrates, fats, proteins, vitamins, minerals – components of food – **nutrients** – necessary
- Everyone requires food – plants make their own – animals and humans get it from plants and other animals
- Humans, animals – directly or indirectly – dependent on plants

Mode of Nutrition in Plants

- Only organisms – prepare own food – using water, carbon dioxide, minerals
- Nutrients – helps in building body, growing, repair damaged parts, provide energy
- Mode of taking food and using it – **nutrition**
- Organism make own food – **autotrophic** nutrition – auto (self) + trophos (nourishment)
- Plants are called **autotrophs**
- Organism eat others for food – **heterotrophic** nutrition – heteros (other)
- Where is food produced – in all parts or one particular part?
- How is it transported?
- How are raw materials transported?

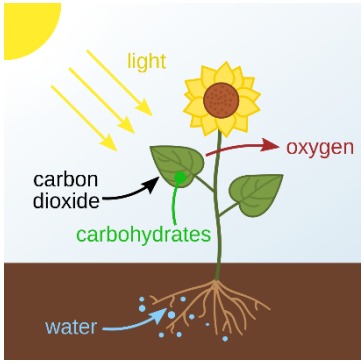
Photosynthesis – Food Making Process in Plants

- Leaves – food factories of plants
- All raw materials – reach leaves
- Water, minerals – absorbed by roots – transported to leaves
- Carbon dioxide – taken from air – through tiny pores – surface of leaves
- These pores – **stomata** – surrounded by 'guard cells'



- Water, minerals – transported to leaves – through root, stem, branches and leaves
- Continuous path or passage – like pipelines – vessels
- Leaves – **green pigment** – **chlorophyll**
- Helps in capture of sunlight – energy used to prepare food from carbon dioxide, water, mineral
- Synthesis – occurs in presence of sunlight – **photosynthesis** – photo (light) + synthesis (combine)
- Unique process – solar energy captured by leaves – stored in plant as food
- Sun – ultimate source of energy for all
- Absence of photosynthesis – no food at all
- All living things – directly or indirectly depend on photosynthesis
- Oxygen produced during photosynthesis – essential for all living things

- Photosynthesis – chlorophyll cells of leaves – presence of sunlight, carbon dioxide, water – prepare carbohydrates
- Carbon dioxide + Water $\xrightarrow[chlorophyll]{sunlight}$ Carbohydrate + Oxygen



- Presence of starch in leaves – indicate occurrence of photosynthesis
- Starch – carbohydrate
- Leaves other than green leaves – also contain chlorophyll
- Other colours – cover the green pigment
- Green patches – water bodies – growth of organism – **algae**
- Algae – photosynthesis

Synthesis of plant food other than carbohydrates

- Carbohydrates – made of carbon, hydrogen, oxygen – synthesize other components – proteins, fats
- Proteins – nitrogenous substances – contain nitrogen
- Nitrogen – present in abundance in air
- Plants cannot absorb this
- Soil – certain bacteria – convert gaseous nitrogen to usable form – release it to soil
- Absorbed by plants along water
- Farmers – add fertilizers – increase nitrogen content
- Plants – fulfil requirements of nitrogen – synthesize proteins and vitamins

Other Modes of Nutrition in Plants

- Some plants – no chlorophyll – no photosynthesis
- These plants – depend on other plants
- This is **heterotrophic mode** of nutrition
- Yellow wiry structure – around stem and branches – plant – *cuscuta*
- Takes readymade food from other plants – **host**
- Takes all nutrients – it is a **parasite**

- Few plants – trap insect and eat it
- Such plants – may be green or other colour
- Pitcher-like or jug-like structure – modified part of leaf
- Top of leaf – forms lid – open and closes
- Inside pitcher – hair directed downwards – traps insect inside
- Digested by digestive juices – nutrients absorbed by plant
- These are **insectivorous plants**

Saprotrophs

- Fluffy umbrella like patches – moist soil – mushroom
- What type of nutrients they require? Where do they get it from?
- These organisms – **fungi**
- Mode of nutrition – nutrients from dead and decaying matter – **saprotrophic nutrition**
- Fungi grow on – pickles, leather, clothes, other articles – left in hot and humid weather – long time
- Fungal spores – present in air – land on wet and warm things – germinate and grow
- Some organisms – live together – share shelter and nutrients – **symbiosis**
- Some fungi – leave inside roots – plants provide nutrients to fungus and fungus provide nutrients and water to plants
- **Lichens** – chlorophyll-containing partner – alga and fungus – live together
- Fungus – provide shelter to alga – alga – prepares food for fungus

How Nutrients are Replenished in the Soil

- Farmers – spread fertilizers and nutrients – why?
- Plants – absorb nutrients and minerals from soil – amount decreases in soil
- Fertilisers and manures – contain – nitrogen, potassium, phosphorous
- Plants grows and stay healthy – nutrient requirements fulfilled
- Crop – absorbs nitrogen
- Gaseous nitrogen – cannot be used by plants – need nitrogen in soluble form
- Bacterium – *rhizobium* – convert gaseous nitrogen to usable form
- Lives in roots – gram, peas, moong, beans, other leguminous plants – provide them with nitrogen – symbiotic relationship
- Leguminous plants – reduce use of fertilizer
- Pulses (*dal*) – obtained from these