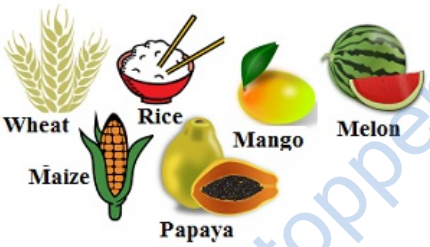
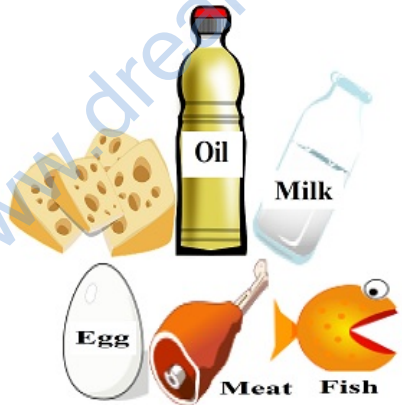
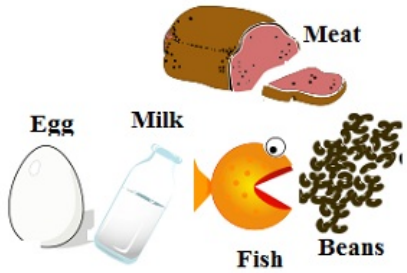
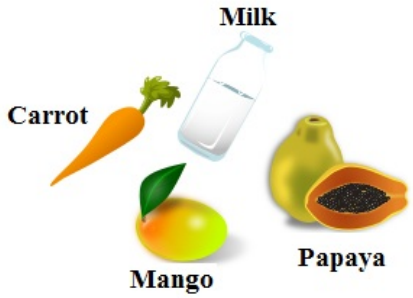
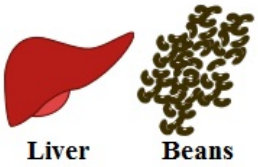
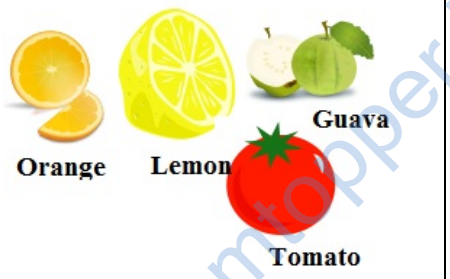
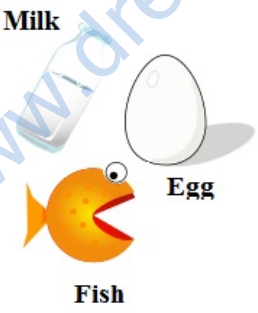
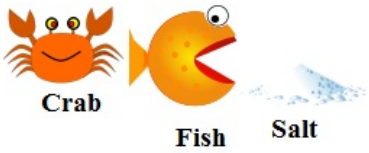
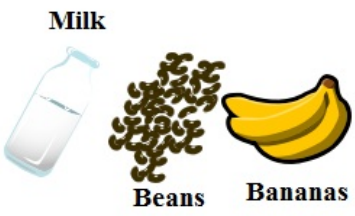
Class 7 Biology Nutrition in Plants

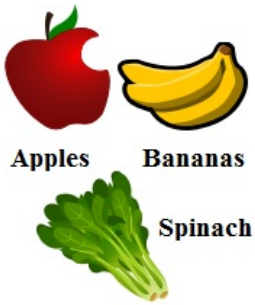
Introduction

Introduction

Food is useful for the survival of the living beings because it serves as a rich source of carbohydrates, proteins, fats, vitamins and minerals required for the supply of energy to carry out necessary life processes, proper growth and development of human body. It is also required for the repair of the damaged body parts and to fight diseases. These components of food are known as the nutrients.

Nutrients	**Food items in which the nutrient is found**
Carbohydrates	
Fats	
Proteins	

Vitamin A	
Vitamin B	
Vitamin C	
Vitamin D	
Iodine	
Phosphorous	

Iron	
Calcium	

Class 7 Biology Nutrition in Plants Nutrition and modes of nutrition

Nutrition and modes of nutrition

The mode of consumption of food by a living being and its utilization by the body is termed as Nutrition. There are two different modes of nutrition:

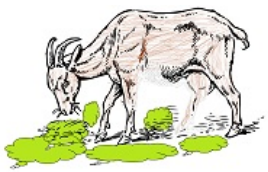
Autotrophic mode of nutrition

- In autotrophic mode of nutrition the living being produces their own food in the presence of simple substances.
- The organisms undergoing this mode of nutrition are termed as autotrophs (auto meaning self; trophos meaning nourishment).
- For example, plants.

Fig. Tree bearing fruits

Heterotrophic mode of nutrition

- In heterotrophic mode of nutrition the living being consumes plants or other animals.
- The organisms undergoing this mode of nutrition are termed as heterotrophs (heteros meaning another; trophos meaning nourishment).
- For example, human beings, animals.

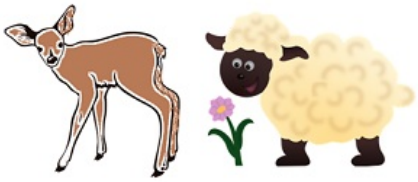


Class 7 Biology Nutrition in Plants Classification of Heterotrophic mode of nutrition

Classification of Heterotrophic mode of nutrition

Herbivores

The organisms that feed on plants are called herbivores. For example, deer, goat, sheep.



Carnivores

The organisms that feed on other animals are called carnivores. For example, lion, tiger, fox.

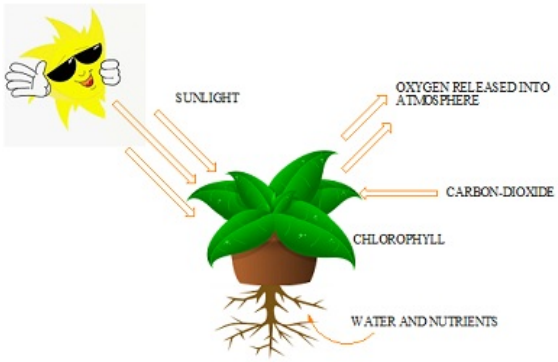
Omnivores

The organisms that feed on both plants and animals are called omnivores. For example, bear, and human beings.

Class 7 Biology Nutrition in Plants — Photosynthesis

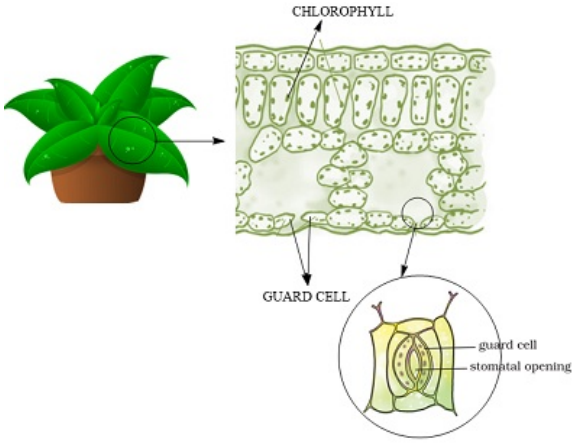
Photosynthesis

- The process by which plants make their own food in the presence of sunlight, carbon-dioxide present in air, water, minerals and chlorophyll present in leaves is termed as photosynthesis.



$$6CO_2 + 6H_2O + \text{light energy} \longrightarrow C_6H_{12}O_6 + 6O_2.$$

- Plants take up carbon-dioxide from the atmosphere through the tiny pores known as stomata present on thesurface of the leaves and surrounded by 'guard cells'.
- The process of photosynthesis releases oxygen in the atmosphere during the synthesis of food.
- Plants absorb the water and minerals from the soil with the help of deep penetrated roots inside the soil and transport them to the leaves of the plants where synthesis of food takes place.
- The green pigment present in leaves known as chlorophyll helps the leaves of plant to capture the sunlight that act as the source of energy to carry out the process.
- After this the chlorophyll holding the cells of leaves in the presence of sunlight, carbon dioxide and water to produce carbohydrates in the leaves and is stored in the plants in the form of energy.



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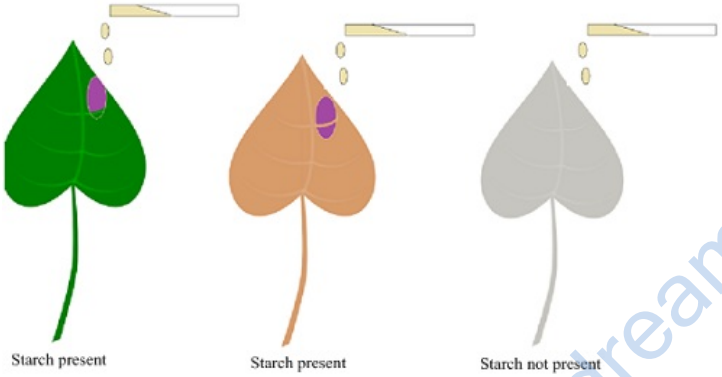
Experiment to prove leaves other than green in colour also u

Experiment to prove leaves other than green in colour also undergo photosynthesis

- Take some plants, one with green leaves and other with some other colour.
- As we know that plants undergoing photosynthesis have stored carbohydrates in them.
- Now performing iodine test will prove that leaves other than green in colour also have stored carbohydrates which in turn will prove that leaves other than green in colour also undergo photosynthesis because iodine in presence of starch turns into blue black colour**.**

But if the leaf does not turn blue black on addition of iodine then it proves that the leaf belongs to a plant that does not undergo photosynthesis



Such plants containing non-green leaves but still exhibiting photosynthesis contains non-green pigments known as anthocyanins and carotenoids in addition to chlorophylls and this pigment anthocyanins are present in such large amounts that they cover up the green due to chlorophyll but the covered up chlorophyll continues to perform its function of carrying photosynthesis

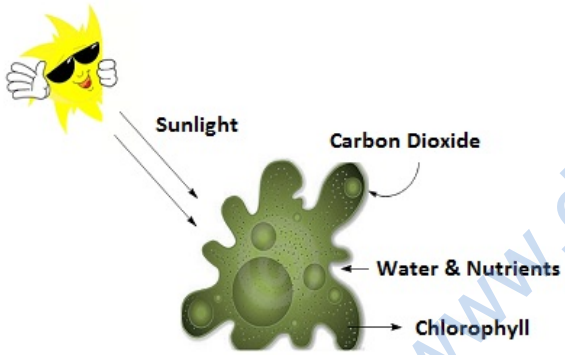
Class 7 Biology Nutrition in Plants

Photosynthesis in algae

Photosynthesis in algae

- We have often observed the presence of some slimy, green patchesin the water of ponds or in stagnant water

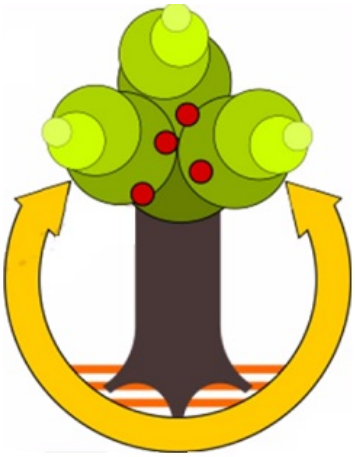
- These green patches arise due to the presence of organisms called algae which contains chlorophyll that is responsible for its green colour.
- Due to the presence of chlorophyll algae are capable of preparing their own food by the process of photosynthesis in the same way autotrophic plants do.



Class 7 Biology Nutrition in Plants Synthesis of plant food other than carbohydrates

Synthesis of plant food other than carbohydrates

- We have seen so far that photosynthesis can only provide us with carbohydrates which contain carbon,hydrogen and oxygen. These components of carbohydrates are used to produce other components of food.
- But nitrogenous substances containing nitrogen, proteins, vitamins and minerals are also a substantial component of food.
- The second source of food for plants is from soil which contains certain minerals like phosphorous, potassium, nitrogen, magnesium, calcium, Sulphur and many other minerals present in dissolved form. These minerals are absorbed by the plants from soil using the root hairs of plants.



- The nutrients required by plants in large quantities are called macronutrients whereas the nutrients required by plants in small quantities are called micronutrients.
- Due to this reason the quality of plants depend upon the quality of soil. To get good yield of plants it is necessary to take care of the quality of the soil.
- Out of the minerals present in soil Nitrogen is a macronutrient for plants. A lot of nitrogen is present in gaseous form (78%) that cannot be used directly by the plants.
- This atmospheric nitrogen is converted into nitrogenous compounds and fix them into the soil that is done by the nitrogen fixing bacteria. This nitrogen is taken up by the plants.
- Therefore, farmers add fertilizers to the soil. These fertilizers enrich the soil with additional nutrients like sodium, potassium, phosphorous, nitrogen that is in turn absorbed by the plants and is used to synthesize other components of food such as proteins and fats.

Class 7 Biology Nutrition in Plants

Parasitic modes of nutrition in plants

Parasitic modes of nutrition in plants

- There are certain plants in nature which do not have chlorophyll and hence cannot produce their own food.
- These plants uses heterotrophic mode of nutrition to derive food for their survival.
- Cuscuta (Amarbel) is a yellow tubular plant twisting around the stem and branchesof a tree that does not have chlorophyll and hence cannot make its own food.

- They climb on other trees known as host plant and absorb the readymade food. Therefore plants like Cuscuta are known as parasite.

Insectivorous plants

- Some other species of plants known as insectivorous plants that are capable of trapping insects and digesting them. These plants are known as pitcher plants with its leaf modified as pitcher.
- The top of the leaf forms a cover which closes or opens the mouth of the modified leaf.
- The pitcher consists of hair like projections directed downwards.
- As soon as an insect lands over the pitcher the cover of the pitcher opens to swallow the insect.
- As soon as the insect gets inside the pitcher the top closes and the insect gets knotted in the hair.
- The plant then digests the insect with the help of the digestive juices secreted inside the pitcher.

Saprotrophs

- Some microorganisms like fungi use another mode of nutrition known as saprotrophic mode of nutrition.
- The organisms undergoing this mode of nutrition are known as Saprotrophs.
- These fungal spores are present in air and grow as dark patches on the food items or other items like pickles, leather and clothes during hot, humid or rainy season.
- They sit on dead and decaying matter where they germinate and grow.
- They secrete a digestive juice that convert them to solution and absorbs the nutrients.

Fig. Spoilt Food with developing fungi

Class 7 Biology Nutrition in Plants — Symbiotic relationship

Symbiotic relationship

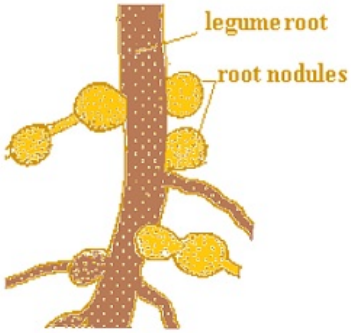
- There are certain organisms that lives together and provides food and shelter to each other. This kind of nutrition is known as symbiotic relationship.
- This kind of relationship is very important for plants because there are certain microorganisms like fungi that lives in the rootsof trees and absorb the nutrients from The fungi in turn help the plants to absorb water and nutrientsfrom the soil required for the proper growth of plants.
- An example is lichens where a symbiotic relation exists between the alga and fungus.

Lichens on the surface of Bark of trees

The algae contains the green pigment called chlorophyll which helps the algae to produce food which is being provided to the fungi too. In return the fungi protects the algae from drying in sunlight by enclosing it inside. So algae provides food to fungi and in return the fungi provides protection to the algae.

- Not only fungi, this relation also exists between a bee and a flower. The bee helps the plant in pollination (the process of transfer of seeds of one flower to another that helps in asexual reproduction in plants) whereas the flower provides pollen grains and nectar to the bee.

- The water and the essential nutrients are made available to the alga which contains chlorophyll and hence is capable to synthesize its own food. The food produced by alga is provided to the fungus.
- But in the recent years addition of manure or nitrogenous fertilizers has enriched the soil with the essential nutrients but has resulted in a decrease in the number of these organisms sharing symbiotic relation with the plants.
- Atmospheric nitrogen cannot be used by plants for production of food. Therefore bacteria known as Rhizobium present in the roots of gram, peas, moongbeansand other legumes converts the atmospheric nitrogen into soluble form that dissolves in soil and can be easily absorbed by plants.



- But these bacteria cannot make their own food and hence the plants in turn provide them with the shelter and food synthesized by them. They exhibit a symbiotic relationship between them.