1 NUTRITION IN PLANTS

INTRODUCTION

- Nutrition is a process of intake of nutrients (like carbohydrates, fats, proteins, minerals, vitamins and water) by an organism as well as the utilisation of these nutrients by the organism. A nutrient can be defined as a substance which an organism obtains from its surroundings and uses it as a source of energy or for the biosynthesis of its body constituents (like tissues and organs) to provide energy for performing various metabolic activities of the organism.

Essential elements:

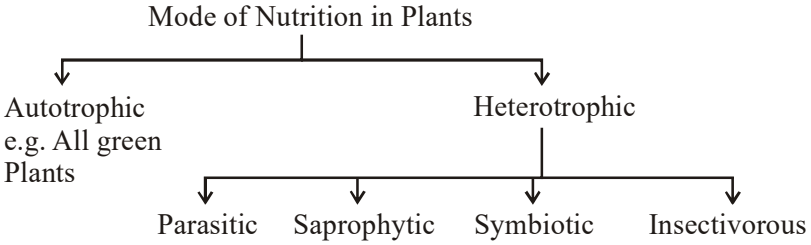
An element is said to be essential if it fulfills the following criteria:

(i) The element must be essential for normal growth and reproduction, and plant cannot proceed its life without this element.

(ii) The requirement of element must be specific and cannot be replaced by any other element .

(iii) The requirement must be direct that is, not the result of any indirect effect, e.g., for relieving toxicity caused by some other substance.

Every organism take in oxygen and give out CO_2 during process of respiration. This oxygen enter in the cell for oxidation of food. This process is completed in mitochondria of cell. By the oxidation of food energy is released in the from of ATP (Adenosine triphosphate). This ATP is used by the body cells to perform various life activities.



AUTOTROPHIC NUTRITION

Auto = Self
Trophic = Nutrition
"Self Nutrition"

- When organisms make their food from simple inorganic substances like H_2O and CO_2, than it is called **Autotrophic Nutrition.** Such organisms are called **Autotrophs.**
- All Green plants are **Autotrophs or Producers** because they make their own food by the process of **photosynthesis.**

(i) **Photoautotrophs :** Those which utilize sunlight for preparing their food. e.g. plants, algae, purple red and green bacteria.

(ii) **Chemoautotrophs :** Those which utilize chemical energy for preparing their food. e.g. Nitrifying bacteria, iron bacteria, sulphur bacteria, methane bacteria.

HETEROTROPHIC NUTRITION

Hetero = Other
Trophos = Nourishment ⌋ **"Other Nourishment."**

1. The mode of Nutrition in which organisms obtain food from plants or other animals is called **Heterotrophic Nutrition.** These organisms are called **Heterotrophs.**
2. Some plants do not have chlorophyll so they cannot synthesize their food and depends on other plants or animals. Such non-green plants include **fungi** some **bacteria** and some **flowering plants.**
3. Heterotrophic plants can be divided in the following types.
   (A) Parasitic Plants
   (B) Saprophytic Plants
   (C) Symbiotic Plants
   (D) Insectivorous Plants

(A) Parasitic Plants

Some non-green plants obtain their food from other green plants are called **parasitic plants.** The plant which provides food is called **host plant.** The parasitic plant develop **special roots** for absorption of food. These roots called **haustoria.** Haustoria penetrate the host tissues and reaches the vascular bundles (xlyem & phloem).

- **Parasitic Plants are of two types:-**

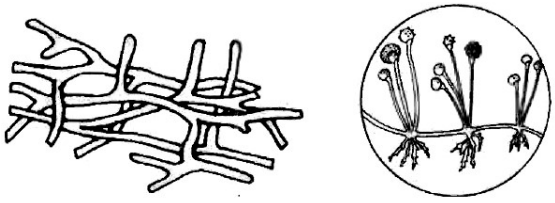
  (a) Total parasitic plant: Completely depend on host plant for their food.

  e.g. (i) Cuscuta or Amarbel
  (ii) Apodanthes
  (iii) Rafflesia (Largest flower in the world)

  (b) Partial parasitic plant:- These plant have green leaves and can synthesise their food but depend on host plant for water & minerals. e.g. **Mistletoe, Sandalwood.**

(B) Saprophytic Plants

These plant obtain their food from dead and decaying matter of animal and plants. E.g. Fungi (bread moulds, mushrooms, some bacteria ***(Bacillus vulgaris).*** Fungi appears as a green, white or brown coloured patches. Microscopically they show thread like structures called **hyphae**. The network of hyphae is called **mycellium**.



(a) Fungal hyphae (b) Bread mould

Fungi secretes digestive juices on dead and decaying matter and convert it into a solution. Then they absorb nutrients from it in soluble forms. Fungal spores are present in the air and they germinate & grow on wet and warm things and spoil the things.

Some fungi are useful for various purposes like

In food	-	Mushrooms (Agaricus)
In Bakery	-	Yeast (Saccharomyces)
In Medicines	-	Penicillium notatum from which Ist antibiotic **penicillin** has been obtained.

Fungi causes diseases in plants like **rust (puccinia), smut (ustilago),** in wheat and ring worm in animals. **Caesar mushroom or poison cup looks like mushroom but it is lethal.**

(C) Symbiotic Plants

Mutual relationship between two organisms in which both organisms are benefitted and they share shelter and Nutrients is called **Symbiosis.** These organisms are called **Symbionts. Certain fungi** live in the roots of trees (Mycorrhizae). The plant provides Nutrients to the fungi and fungi help the plant to take up water and nutrients from the soil.

Lichens are symbiotic association between **algae and fungi.** in which fungi provides shelter, water and minerals to the algae and algae provide food to fungi by photosynthesis. Lichens are termed as pollution indicator as they cannot survive in air polluted SO_2 condition.

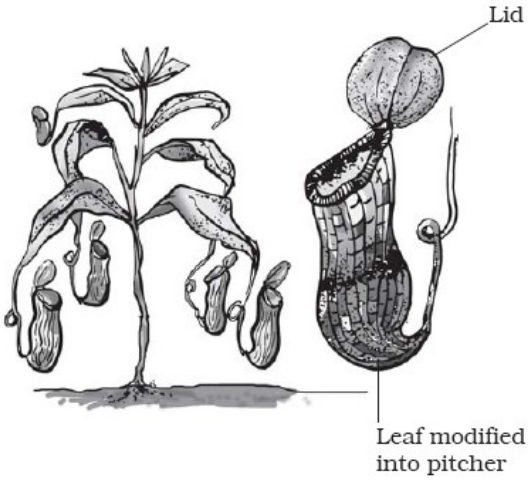
Leguminous plants like gram, moong, urad, peas and beans have **nodules** in which **Rhizobium** bacteria is found. This Rhizobium convert atmospheric nitrogen into nitrates for leguminous plant.

(D) Insectivorous plants

Some plants can trap insects and digest them to obtain nitrogen are called **Insectivorous** plants. These plants are green but found in nitrogen deficient soil. So these plant trap insects and feed on to fulfill their nitrogen requirement. These plants are known as **partial autotrophs. e.g. Pitcher plant (Nepenthes), Venus flytrap, Sundew, Bladderwort**

In pitcher plant **leaf** is modified into pitcher. Leaf apex forms a **lid** which helps in opening and closing of pitcher. Inside pitcher downwardly directed hairs are present. Which does not let an insect to come out.

When insects sit on opening of pitcher, it slips down and is trapped by hairs than lid gets closed and insect is digested by digestive juice secreted by pitcher.



PHOTOSYNTHESIS

The process by which green plant prepare their food in the presence of sunlight, (Carbondioxide)CO_2, water, chlorophyll.

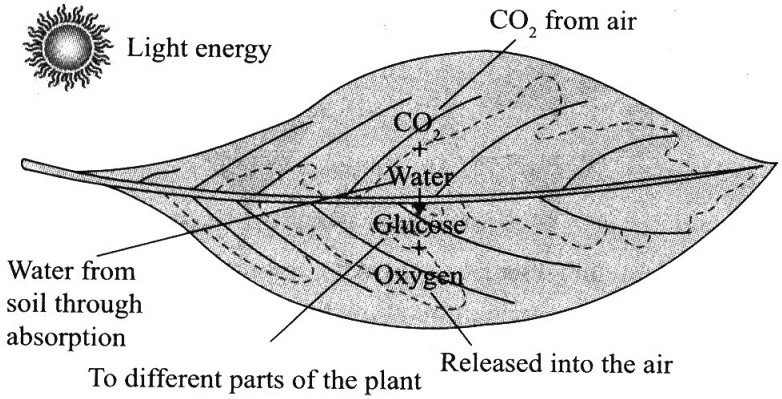


Fig. 1.4. Photosynthesis

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6H_2O + 6O_2$$

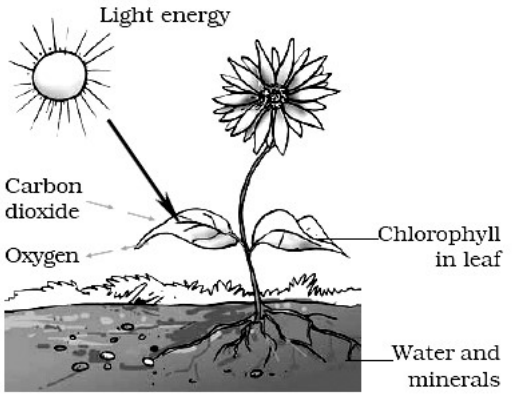
There are four requirement for photosynthesis.

(A) **Sunlight:-** It comes from sun & provide energy for photosynthesis.

(B) **Carbon dioxide (CO_2):-** It is obtained from air and taken through tiny pores called **stomata** present on the under surface of leaves.

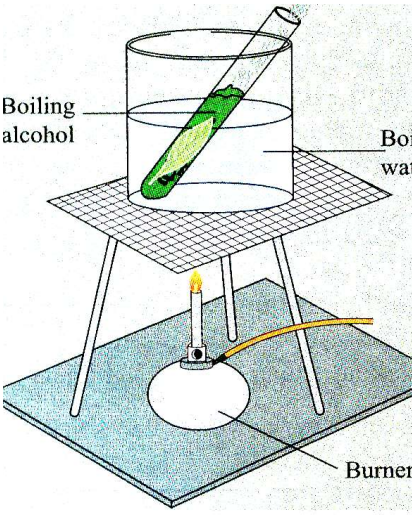
(C) **Chlorophyll:-** The chlorophyll is present in the **chloroplast.** Chloroplast regarded as **Kitchen of cell** and present in Green leaves.

- Besides chlorophyll cetain other pigments are also present in plants like :
  (a) Carotenes : Organe in colour e.g. Carrot.
  (b) Xanthophylls : Orange yellow in colour e.g. Maize.
  (c) Phycobilins : Different colours like red, violet e.g., Blue-green algae, brown algae etc.
  (D) Water (H_2O):- They are obtained from the **soil** by the roots of plants and are transported to the leaves.
- Plants have Vascular tissues called **Xylem** & **Phloem.**
  (i) **Xylem** transport **water and minerals** to the leaves.
  (ii) **Phloem** transport **food (Sucrose)** to various part of plant.



DESTARCHING A LEAF

1. Place the potted plant in a dark cupboard for 48 hours. This ensures that no starch is made in leaves during that period. Any starch that is present in the leaf will be converted to glucose and used, or transported to other parts of the plant.
2. We expose the destarched plant to sunlight for 4-6 hours to ensure that photosynthesis occurs.
3. The green leaf is then placed in boiling water, until it is soft. The boiling water breaks down the cell walls and membranes so that iodine solution can penetrate.
4. The boiled leaf is then put into a test tube with alcohol (chlorophyll is soluble in alcohol) and then into a water-bath so that the chlorophyll can be dissolved and extracted.
5. The leaf is rinsed off in cold water before we test it.
6. A few drops of iodine solution are dropped on it and it is left to stand for a few minutes.
7. The iodine solution colours the leaf blue-black, indicating the presence of starch.



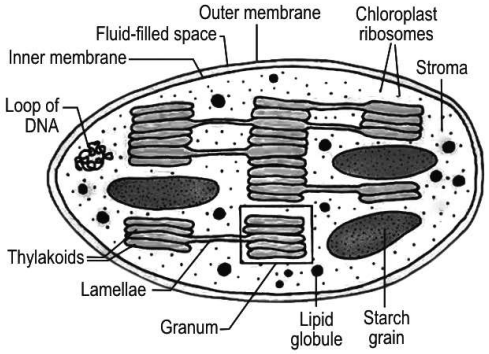
Experiment to remove chlorophyll from a leaf

SYNTHESIS OF PLANT FOOD OTHER THAN CARBOHYDRATE (AMINO ACID & PROTEINS)

1. Plants synthesize carbohydrate by the process of photosynthesis, which contain C, H and O. From these proteins, fats are synthesized by plants.
2. Proteins are **building blocks** of all living organisms and help in growth, repair, regeneration etc.
3. Proteins contain N_2, which can not be absorbed by plants from surrounding atmosphere.
4. In soil certain bacteria like **Rhizobium, Nitrobacter, Azobacter**, etc are found which convert gaseous nitrogen into usable form i.e. **Nitrates** and **Nitrites** and released into soil.
5. These nitrites & nitrate are absorbed by plant roots in soluble form and forms **proteins.**
6. Nitrogen can also be supplied to the plants by **fertilizers** added by farmers to the soil.

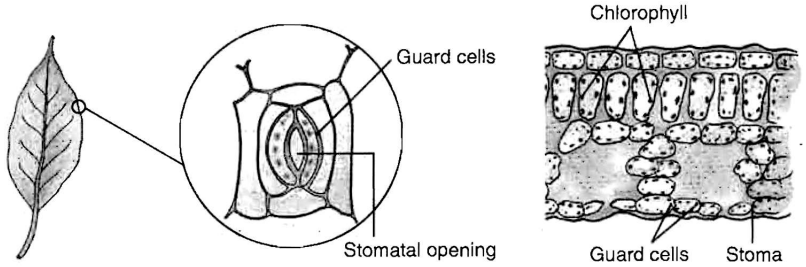
ROLE OF LEAVES IN PHOTOSYNTHESIS

1. Photosynthesis Occurs in Green parts of plant like green stem, branches and leaves. Leaves are the main food manufacturing parts of plants. So called **food factories.**
2. Leaves have **Chloroplasts** and Chloroplasts contains **Chlorophyll** which are the **sites of photosynthesis** Chlorophyll absorbs solar energy or sun light to initiate **photosynthesis.**



Internal structure of Chloroplast

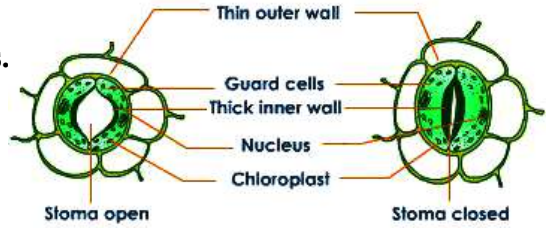
3. Leaves have tiny pores called **stomata.** Carbon dioxide enters the leaves through stomata.



(*a*) Leaf (*b*) Stomata (*c*) A section through a leaf

OPENING OF STOMATA

1. Stomata open into small cavities inside the leaves.
2. Stomata is guarded by two kidnwey shaped **guard cells.**
3. In sunlight, water from surrounding cells diffuses into the guard cells so, guard cells become **turgid.**
4. Their outer wall bulge out and inner wall drawn apart so stomata widens and than open.



CLOSING OF STOMATA

1. At the time of closing of stomatal opening, water diffuses out of the guard cells.
2. The Guard cells became **flaccid**, their inner thick walls become straight and stomata get closed.

POINTS TO REMEMBER

1. Food is utilized for Energy.
2. Various food components i.e. carbohydrate proteins, fat, vitamins, minerals are called Nutrients.
3. Green plants are **Autotrophs** or **Producers.**
4. Photosynthesis is a process by which green-plant convert solar energy or sunlight into chemical energy.
5. Chlorophyll present in chloroplast of leaves.
6. Plant stores food as **Starch.**
7. Cuscuta or Amarbel is Parasitic Plant.
8. Fungi are saprophytic plants.
9. Lichens show symbiotic association between algae & fungi.
10. Rhizobium bacteria is found in Leguminous plants nodules.
11. In pitcher plant leaf is modified into pitcher. It is insectivorous plant.

CONCEPT APPLICATION LEVEL - I [NCERT Questions]

Q.1 Why organisms need to take food ?

Ans. Food is needed by all living organisms for the following purposes:

(a) It is meant for the general growth and development of an organism. If it is not in sufficient amount, then it shows insufficient growth and development, along with hunger sign.

(b) It is meant to provide energy. We need energy for movements such as running, walking or raising our arm.

(c) It is also needed by living beings for repairing of their damaged parts.

(d) It gives us resistance against diseases and protects us from infections.

Q.2 How would you test the presence of starch in leaves ?

Ans. The presence of starch in leaves can be tested by **'Iodine Test'**. Iodine turns starch solution into blue-black colour.

Q.3 Give a brief description of the process of synthesis of food in green plants ?

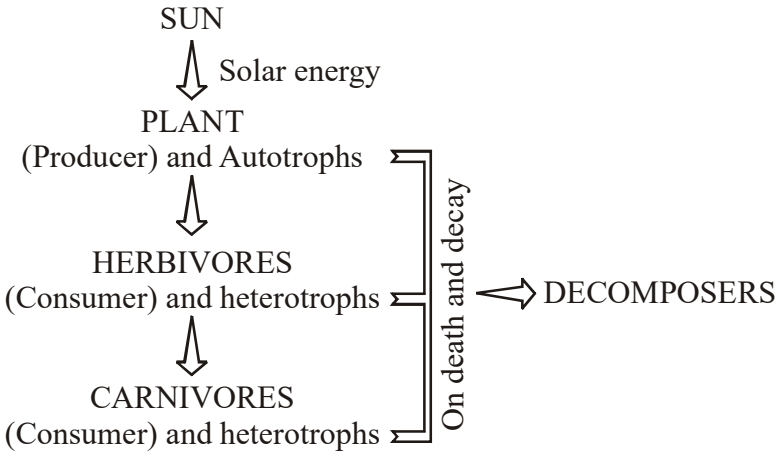
Ans. Leaves of a plant have a green pigment called chlorophyll. In the presence of sunlight, they use carbon dioxide and water to synthesise carbohydrate.

$$\text{Carbon dioxide} + \text{Water} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \text{Carbohydrate} + \text{Water} + \text{Oxygen}$$

During the process, oxygen is released. The carbohydrates ultimately get converted into starch.

Q.4 Show with the help of a sketch that plants are the ultimate source of food ?

Ans.



Q.5 Distinguish between a Parasite and Saprotroph.

Ans.

Parasite	Saprotroph
1. A parasite takes the food from the organism on which it survives.	1. They secrete digestive juices on the dead and decaying matter and convert it into a solution and then absorb it.
2. They feed on a living organism.	2. They feed on dead and decaying matter.
3. The organism on which it survives is called host.	3. They do not feed on a living organism.
4. It deprives the host of valuable nutrients.	4. There is no host at all.

CONCEPT APPLICATION LEVEL - II

Section–A

SOME IMPORTANT QUESTIONS

Q.1 What are nutrients?

Ans. The components of food like carbohydrates, proteins, fats, minerals and vitamins are called nutrients.

Q.2 How are humans and animals dependent on plants?

Ans. All living organisms require food. Plants can make their food themselves but animals including humans cannot. They get it from plants or animals that eat plants. Thus, humans and animals are directly or indirectly dependent on plants.

Q.3 Why nutrients are important for an organism?

Ans. Nutrients are very important for organisms, as these enable to build their bodies, to grow or repair damaged parts of their bodies and provide energy to carry out life processes.

Q.4 What is nutrition?

Ans. Nutrition is the mode of intake of food by an organism and its utilization by the body.

Q.5 What is so special about the leaves that they can synthesise food but other parts of the plant cannot?

Ans. Leaves have a green pigment called chlorophyll, which is not found in other parts of the plants. Therefore, photosynthesis, food making process occurs in leaves only, not in any other part of the plant.

Q.6 What is the ultimate source of energy for all living organisms?

Ans. Sun is the ultimate source of energy for all living organisms.

Q.7 Write down the function of stomata.

Ans. Carbon dioxide, present in air is taken in through stomata, present on the surface of leaves. Carbon dioxide is needed by plants for synthesis of food by the unique process of photosynthesis.

Q.8 Do plants with deep red, violet or brown leaves also carry out photosynthesis?

Ans. Yes, the leaves other than green also have chlorophyll. The large amount of red, brown or other pigments mask the green colour. Photosynthesis takes place in these plants also.

Q.9 Pitcher plants are green and carry out photosynthesis. Why do they feed on insects?

Ans. Pitcher plant is green and carry out photosynthesis to prepare carbohydrates. Even then to fulfil their requirement of nitrogenous compound for its growth and development, it feeds upon insects. Such plants do not get or retrieve amount of nutrients from the soil in which they grow.

Q.10 Why do insectivorous plants eat insects?

Ans. To fulfil their need of nitrogenous compound.

Q.11 What are lichens?

Ans. Lichens are the organisms in which an alga and a fungus live together. The fungus provides shelter, water and minerals to the alga and in return, alga provide food which it prepares by photosynthesis.

Q.12 How symbiotic bacterium called Rhizobium is important for the farmers?

Ans. Usually crops require a lot of nitrogen. But they cannot utilize atmospheric nitrogen. They need it in soluble form. The bacterium called Rhizobium can convert atmospheric nitrogen into a soluble form. But Rhizobium cannot make its own food, so it survives in the roots of gram, peas, moong, beans and other legumes for food and provides them nitrogen. In return, the plant provides food and shelter to the bacteria. They have symbiotic relationship. This association is of great importance for the farmers.

SECTION–B

PREVIOUS YEAR'S NSO QUESTIONS

Q.1 A group of students of class 7th were performing an experiment. Among them a student poured alcohol on a plant continuously for a long time. The plant could not prepare food on its own any more. Which of the following statements explains the reason behind it ? **[NSO-2010]**

(A) Alcohol absorbed all the food prepared by the plant.
(B) Alcohol does not let the plant absorb carbon dioxide from the air.
(C) Alcohol dissolved all the minerals present in the plant.
(D) Alcohol dissolved the chlorophyll present in the plant.

Q.2 Megha performs a test on starch's presence. She takes a bowl of rice, a piece of bread, a slice of lemon and a s lice of cheese. She puts two drops of iodine solution on each food item and notes her observation by putting tick (v') if the colour of the iodine changes or cross (x) if the colour of iodine does not change with the given food items. What will be her observation? **[NSO_2011]**

	Rice	Bread	Lemon	Cheese		Rice	Bread	Lemon	Cheese
(A)	✓	×	✓	×	(B)	✓	✓	✓	×
(C)	✓	✓	×	×	(D)	✓	✓	×	✓

Q.3 The leaves are arranged in different ways in different plants to get maximum exposure of the sunlight. This arrangement is called _____.

(A) Venation (B) Phyllotaxy (C) Geotropism (D) Phototropism.

Q.4 Read the given activity. What would you most likely observe for the plant and why? **[NSO_2012]**

Activity

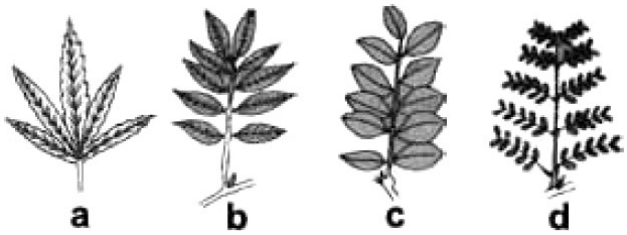
Take a potted plant. Put it in a cardboard box and close the box. Make a hole on one side of the cardboard box in such a way that light enters only through this hole. Keep watering the plant regularly for a few days.

(A) The plant would bend towards the hole because it has to exchange gases through hole.
(B) The plant would grow upright inside the box because it is getting all the essential requirements for growth.
(C) The plant would grow upright inside the box because it is not getting direct sunlight.
(D) The plant would bend towards the hole because plant responds to light.

Q.5 Arpita took a strip of blotting paper of 3 cm × 5 cm and clipped one half on the upper surface and the other half on the lower surface of a leaf. What would she most likely observe after one hour? **[NSO_2012]**

(A) Blotting paper clipped on the upper surface is more wet.
(B) Blotting paper clipped on the lower surface is more wet.
(C) Blotting paper is equally wet on both the surfaces of the leaf.
(D) The observation cannot be predicted.

Q.6 leaves may be simple or compound. Which of the given figures can be called as compound leaves? **[NSO_2012]**



(A) (a) only (B) (b), (c) and (d) (C) (a) and (d) (D) All of these

Q.7 Select the correct pair. **[NSO_2012]**

(A) Spinach – leaves (B) Carrot – Stem
(C) Cauliflower - Roots (D) Onion – Flowers

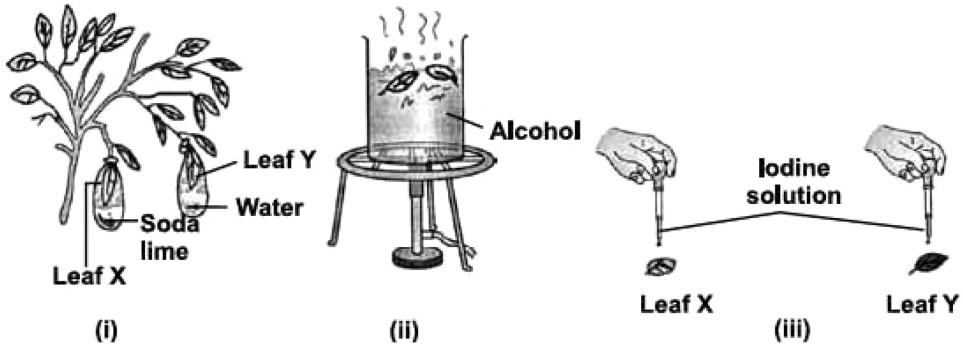
Q.8 Garima took a plant and placed it in the dark for 24 hours to de-starch its leaves. After that she performed an activity as shown here.

(i) She put one leaf (marked as X) in clean plastic bag containing soda lime and another leaf (marked as Y) in a clean plastic bag containing water. Then she left the plant in sunlight for 6 hours.

(ii) She took out the leaves and boiled them in alcohol.

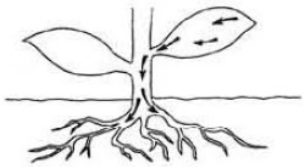
(iii) She performed the iodine test on the leaves.

Select the option with correct iodine test results and the conclusions of the activity. **[NSO_2012]**



	Leaf X (Iodine test)	CO_2 is necessary for photosynthesis	Leaf Y (Iodine test)	CO_2 is necessary for photosynthesis
(A)	✓	Yes	×	No
(B)	×	Yes	✓	Yes
(C)	✓	No	×	Yes
(D)	×	No	✓	No

Q.9 For survival of a plant it is essential that all its parts get the following substances:



[P–Carbon dioxide Q–Oxygen R–Sugar S–Water]

Which of these substances is transported along the pathway shown in the figure? **[NSO_2012]**

(A) P and Q (B) Q and R (C) Q, R and S (D) P, Q and R

Q.10 Read the given statements and select the correct option.
Statement 1 : Plants serve as the ultimate food source for all the organisms whether herbivores or carnivores.
Statement 2 : Plants use solar energy to prepare their own food. **[NSO_2012]**
(A) Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
(B) Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
(C) Statement 1 is true but statement 2 is false.
(D) Both statements 1 and 2 are false.

Q.11 Root hairs are most important to a plant because they _____. **[NSO_2013]**
(A) Anchor a plant to the soil (B) Provide a habitat for N_2 fixing bacteria
(C) Increase the surface area for absorption (D) Contain xylem tissue.

Q.12 Which of the following is classified correctly? **[NSO_2013]**
(A) Banana : Fibrous root : Reticulate venation (B) Banyan: Tap root: Parallel venation
(C) Rose : Tap root : Reticulate venation (D) Maize: Fibrous root: Reticulate venation

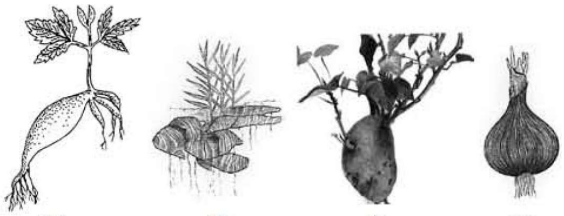
Direction (Q. 13 & 14) Refer the given passage and answer the following questions. **[NSO_2013]**
Some organisms like fungi , etc. take in nutrients in solution form from dead and decaying matter, and are called saprotrophs. Fungi also grow on pickles, leather clothes and other articles that are left in hot and humid weather for long lime. Certain fungi live in the roots of trees and share shelter and nutrients. This is called symbiotic relationship.

Q.13 Which of the following statements is /are incorrect?
(i) Fungi are called saprotrophs because they grow on pickles, leather and clothes.
(ii) Saprotrophs lack chlorophyll, so cannot make food by photosynthesis.
(iii) Like some fungi, lichens also show symbiotic relationship.
(iv) The bacterium called *Rhizobium* shows symbiotic relationship as it provides shelter, water and minerals to legumes and, in return, the legumes provide food which they prepare by photosynthesis.
(A) (i) and (iv) (B) (i) and (ii) (C) (ii) and (iii) (D) (iv) only

Q.14 Which of the following organisms shows symbiotic relationship?
(A) All fungi (B) Lichens (C) *Rhizobium* (D) Both B & C

Q.15 Which of the following statements is/are true (T) or false (F) regarding nutrition in organisms?
(i) Photosynthesis also occurs in leaves having colour other than green.
(ii) The process of photosynthesis first produces a simple carbohydrate called glucose which then gets converted into a complex carbohydrate called starch.
(iii) *Cuscuta* is a yellow-coloured plant but it can synthesize its own food by photosynthesis.
(iv) In a symbiotic association, *Rhizobium* bacteria derive their nutrition from fungus. **[NSO_2014]**
(A) (i)-F, (ii)-T, (iii)-F, (iv)-T (B) (i)-F, (ii)-T, (iii)-T, (iv)-T
(C) (i)-F, (ii)-F, (iii)-F, (iv)-T (D) (i)-T, (ii)-T, (iii)-F, (iv)-T

Q.16 A teacher showed the following plants to students and asked them to write their methods of reproduction.



Given below are answers written by the students :

Student P : W, X and Y propagate vegetatively through stem.

Student Q : W and X are rhizomes which propagate vegetatively through roots.

Student R : Z is called bulbil which propagates vegetatively through stem.

Student S : Y vegetatively propagates through roots.

Which student(s) wrote the correct answer? **[NSO_2014]**

(A) Students P and S (B) Only Student S (C) Students Q and R (D) Only Student Q

Q.17 Which of the following statements support(s) the fact that the upper surface of a leaf is usually greener than the lower surface?

(i) More chlorophyll is present on the upper surface to absorb more light.

(ii) There are more stomata present on the upper surface than the lower surface.

(iii) More sugar is formed on the lower surface.

(iv) The green leaves look greener under the hot Sun. **[NSO_2014]**

(A) (i) only (B) (ii) and (iii) (C) (ii) and (iv) (D) (iv) only

CONCEPT APPLICATION LEVEL - III

SECTION-A

- **Fill in the blanks with suitable words.**

1. Plants stores food material in the form of _____
2. Green plants are called _____ as they synthesize their own food materials.
3. Chlorophyll pigments are present in _____ of _____
4. Plants take _____ and release _____ during photosynthesis.
5. _____ are the pores present on leaf surface for exchange of gases.
6. _____ Nutrition is found in non-green plants.
7. Lichens are the symbiotic association between _____ and _____.
8. Opening and closing of stomata is controlled by _____.
9. Cropes require _____ for the formation of proteins.
10. _____ is modified into pitcher in insectivorous plant.
11. Presence of starch is tested with the help of _____.
12. Hetrotrophs derive their food from _____.
13. _____ is a parasitic plant.
14. In photosynthesis, the sun's energy is captured by the pigment called _____.
15. Plants which obtain their food from dead and decaying matter are called _____.
16. During photosynthesis, _____ is taken in and _____ is given out.

SECTION - B

One Word Answer Questions :

1. A mutually beneficial relationship between two living organisms.
2. The process by which plants prepare their food by sunlight
3. The process of taking food for energy.
4. All green plants are.
5. A gas used by plant for photosynthesis
6. The gaseous exchange takes place in leaves by
7. Amarbel is example of
8. Sucking root of parasitic plant is called
9. Venus fly trap & bladder wort is example of
10. Leguminous plants show symbiosis with a bacteria namely.
11. Type of nutrition found in fungi, lichen, amarbel and pitcher plant.
12. A parasite plant with long, yellow and slender stem.
13. The pores in leaves through which exchange of gases takes place.
14. A plant with both autotrophic and heterotrophic mode of nutrition.
15. The gas released during photosynthesis.

SECTION - C

- **Match the Columns :**

1. Match the following.

Column I	**Column II**
(A) Autotrophs	i. Tiger
(B) Heterotrophs	ii. Mushroom
(C) Carnivores	iii. Cuscuta
(D) Saprophytes	iv. Green plants
(E) Parasite	v. Animals

2. Match the items given in Column I with those in Column II.

Column I	**Column II**
(A) Chlorophyll	(P) Bacteria
(B) Nitrogen	(Q) Heterotrophs
(C) Amarbel	(R) Pitcher plant
(D) Animals	(S) Leaf
(E) Insects	(T) Parasite

SECTION - D

1. Mark 'T' if the statment is true and 'F' if it is false:
   (i) Carbon dioxide is released during photosynthesis. (T/F)
   (ii) Plants which synthesise their food themselves are called saprotrophs. (T/F)
   (iii) The product of photosynthesis is not a protein. (T/F)
   (iv) Solar energy is converted into chemical energy during photosynthesis. (T/F)

ANSWER KEY

CONCEPT APPLICATION LEVEL - II

SECTION - B

Q.1	D	Q.2	C	Q.3	B	Q.4	D	Q.5	B	Q.6	B	Q.7	A
Q.8	B	Q.9	B	Q.10	A	Q.11	C	Q.12	C	Q.13	A	Q.14	D
Q.15	A	Q.16	D	Q.17	B								

CONCEPT APPLICATION LEVEL - III

SECTION-A

1.	starch	2.	autotrophs	3.	leaf, plant	4.	CO_2, O_2
5.	stomata	6.	Parastic	7.	algae, fungi	8.	guard cell
9.	nitrate	10.	leaf	11.	Iodine	12.	Other organisms
13.	Cuscuta	14.	Chlorophyll	15.	Saprophytes	16.	Carbondioxide, Oxygen

SECTION - B

1. Symbiosis	2. Photosynthesis	3. Nutrition	4. Autotrophs
5. Carbondioxide	6. stomata	7. total parasitic plant	8. Haustoria
9. insectivorous plant	10. rhizobium	11. Hetrotropic	12. Amar bel
13. Stomata	14. Mixotropic	15. Oxygen	

SECTION - C

1. (A) – (iv), (B) – (v), (C) – (i), (D) – (ii), (E) – (iii)
2. (A) - S, (B) - P, (C) - T, (D) - Q, (E) - R

SECTION - D

1. (i) - F, (ii) - F, (iii) - F, (iv) - T