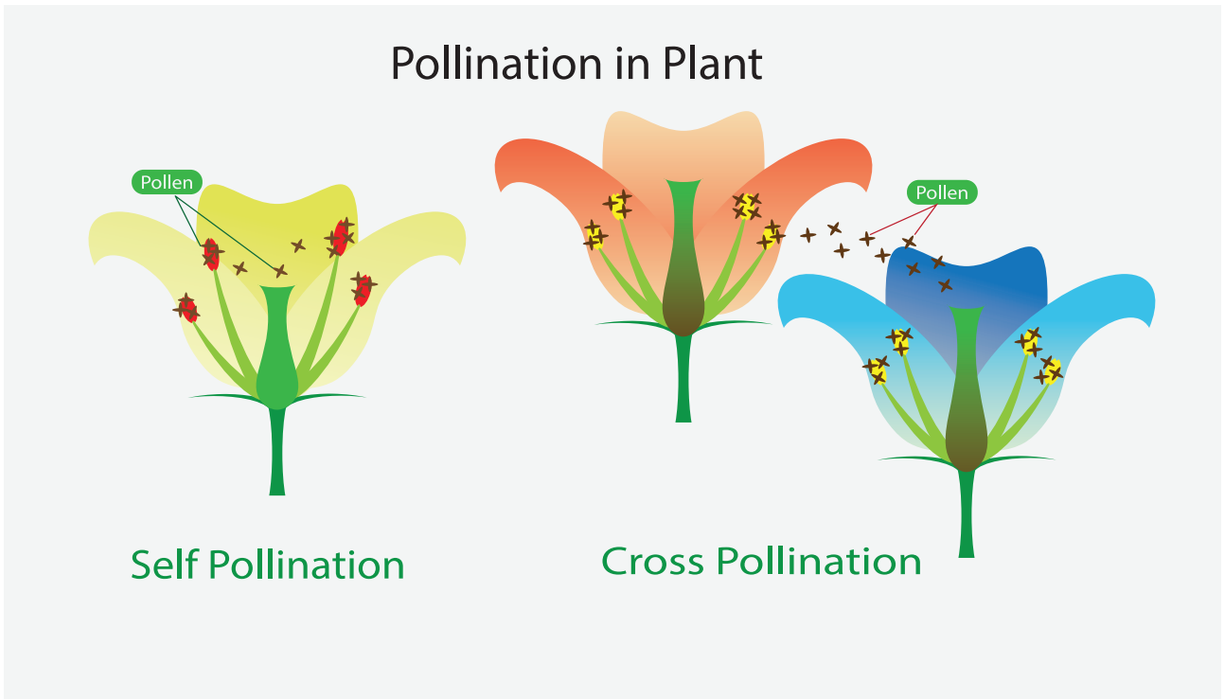
Unit 5

Reproduction and Modification in Plants



Learning Objectives

After studying this lesson, students will be able to:

- understand how a flower becomes a fruit with seed through pollination and fertilization.
- acquire knowledge about pollination and pollinators.
- differentiate self pollination and cross pollination in plants.
- know about the modification of root, stem and leaves.
- understand how these modifications are useful to animal and human being.

Introduction

We know already that flowering plants have root, stem and leaves. They are called vegetative organs. Flowers, fruits and seeds in a plant are called reproductive organs. In earlier classes we have seen that new plants can be grown from seeds. In this lesson, we are going to know how a flower changes itself into a fruit, and the modifications of root, stem and leaves of a plant.

5.1 Reproduction

ACTIVITY 1

Aim

To raise a new generation of plant from watermelon and potato.

Materials required

Two pots with soil, potato, watermelon seeds and water.

Procedure

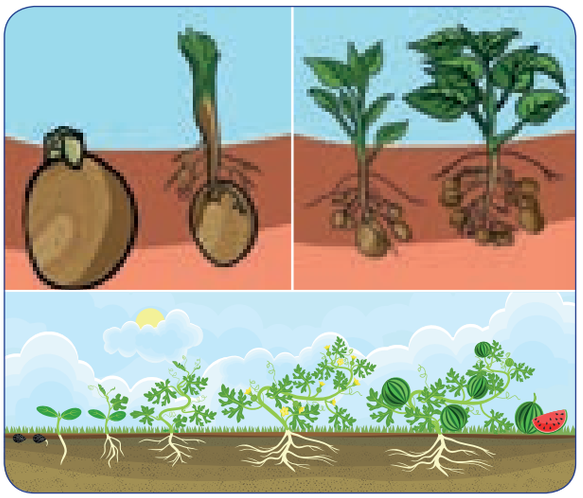
Fill both pots with soil mixed with compost or manure. Take a young potato. Ensure that it is not dried up and the skin still looks fresh. Bury a potato in one pot. Sow watermelon seeds in another pot. Pour water regularly and maintain the plant.

Observation

After few days, we can see a single plant arising from a buried potato. Plants arise from the pot sowed with watermelon seeds. Each seed produces a plant.

We can see from this activity that watermelon plant is produced from that seeds. Potato plant is not from seed, but from the stem tuber (vegetative part). Seed is not only the source for new generation, even vegetative part of a plant can be used to produce a new plant.

The process by which plants and animals produce young ones and increase their number is known as 'reproduction'. Drumstick tree can be grown from both seeds and stem cuttings. When plants are reproduced from the seeds we call that process as **sexual reproduction.** All other ways of reproduction without seed are called as **asexual reproduction.**



Reproduction in plants

ACTIVITY 2

Find out how these plants reproduce.

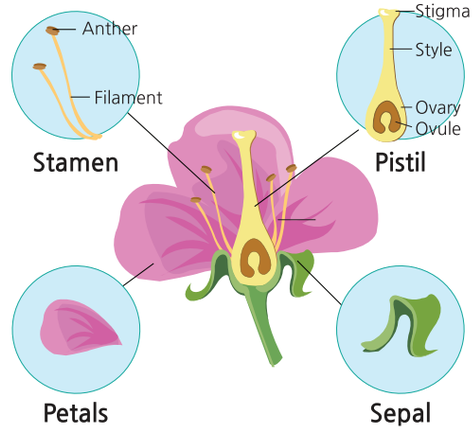
Sl. No.	Name of the plant	Reproductive Part			
		Seed	Stem	Cutting	Layering
1.	Mango				
2.	Potato				
3.	Banana				
4.	Tamarind				
5.	Rose				
6.	Mustard				
7.	Coriander				
8.	Moringa				
9.	Pumpkin				
10.	Radish				

5.2 Sexual reproduction

Seed is produced from a flower by the process of pollination and fertilization. This is known as sexual reproduction. To understand how seeds are formed in a flower, first we need to understand parts of a flower.

ACTIVITY 3

Take a flower. Dissect it longitudinally as shown in the figure and find the parts inside the flower. Can you identify the male reproductive part, androecium (stamen, filament and pollen sac)? Carefully observe the female reproductive part, gynoecium (ovary, style and stigma). If they are not seen clearly, gently pluck off the sepals and petals. Make a drawing of the parts and arrange them in your notebook.



L.S. of a flower showing its parts

5.2.1 Parts of flower

Let us compare few buds and opened flowers of **Hibiscus and Datura.** Observe bud and opened flower of **Hibiscus** and **Datura.** We can tabulate the characteristics of Hibiscus and Datura flowers as below.

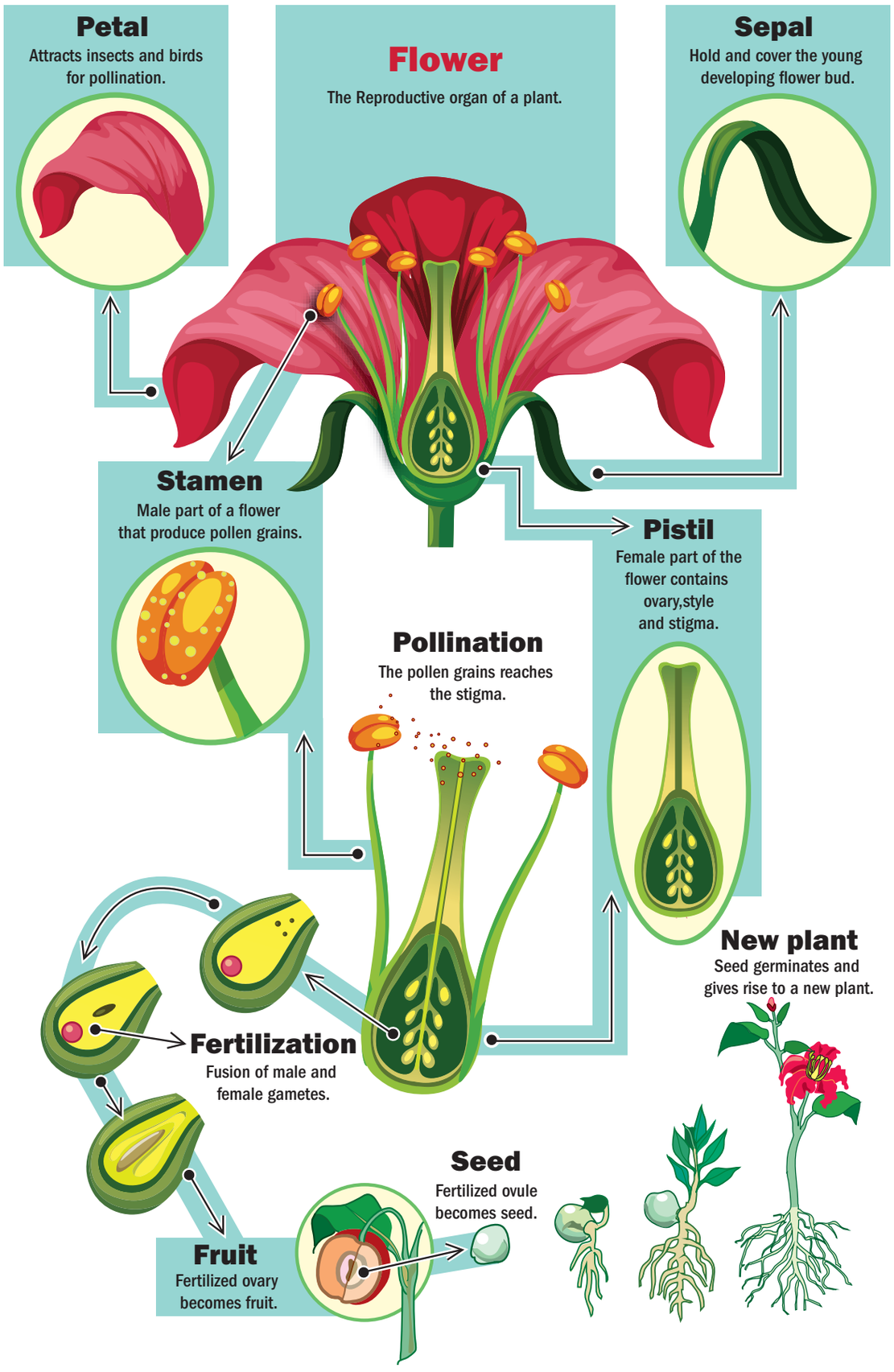
Hibiscus flower	
Bud	**Opened flower**
Green colour	Bright colour
Sepals	Petals
Dissected Hibiscus flower	
Bud	**Opened flower**
Curled petals	Expanded petals
Small tube with yellow lobes - Anthers	Expanded tube with yellow lobes -Anthers
	

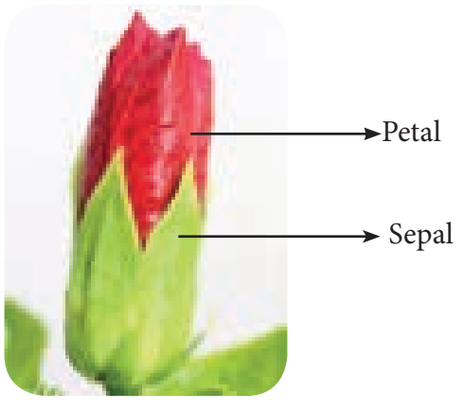
Datura flower	
Bud	**Opened flower**
Green colour	White colour
Sepals	Petals
Dissected Datura flower	
Bud	**Opened flower**
Curled petals	Expanded petals
Small yellow lobes-Anthers	Expanded yellow lobes-Anthers
	

In a bud, we can see a green colour, leaf like structure which cover the whole bud or flower. Each of these green leaf like structure present as an outermost layer is called as **sepal**. This outer most ring of sepals is known as **calyx.**

Petals are the largest part of flowers. They are often attractive, brightly coloured, sometimes sweet scented and attract the insects. This ring of **petals** together is called **corolla**.

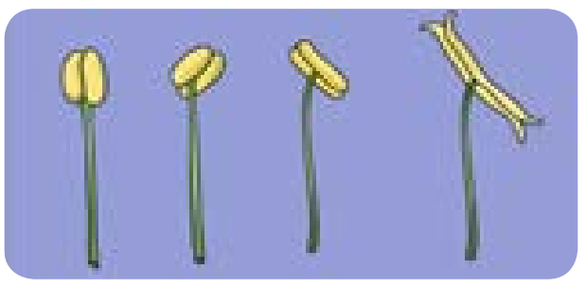
SEXUAL REPRODUCTION IN PLANTS





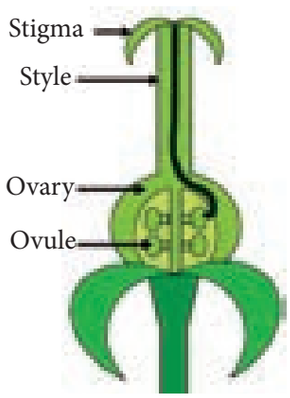
Sepal and Petal

Inside corolla, in **Hibiscus,** we can observe a long tube on which many stamens are arranged. But, in **Datura** we can see only five stalked structures, stamens. This ring or whorl of a flower is called **androecium.** Each stamens consists of two parts – a stalk called filament and a lobe called anther. If you touch these lobes in a mature flower, we can get a powdery substance called pollen grains (male reproductive part).



Androecium - Male part of the flower

Inside androecium whorl, we can find a female reproductive part of the flower, called gynoecium. You will find this part with a swollen bottom part.



Gynoecium – Female reproductive part

This is the ovary. Seeds are produced in this part. On top of the ovary there is a slender tube like structure called style. The top most sticky tip of the style is stigma. Pollen grains are received by the stigma. This is the fourth whorl of a flower.

5.2.2 Types of flowers

Flowers can be divided into two types. They are explained below.

Complete Flower

If all the four whorls - calyx, corolla, stamens and pistil are present, then it is called as complete flower. Complete flowers are bisexual flowers.

Incomplete Flower

If any of these four whorls is missing, then it is called as incomplete flower. Incomplete flowers are unisexual flowers. There are two types of unisexual flowers, **male flower** and **female flower**.

The flower with androecium and without gynoecium is called as **male flower** and the one with gynoecium and without androecium is known as **female flowers**.

DO YOU KNOW?

Sunflower is not a single flower. It is a group of flowers clustered together. A group of flowers arranged together is called inflorescence. *Tridax procumbens*, looks like a single flower, but it is an inflorescence. Leaf juice of this plant is used to cure wounds and cuts.

ACTIVITY 4

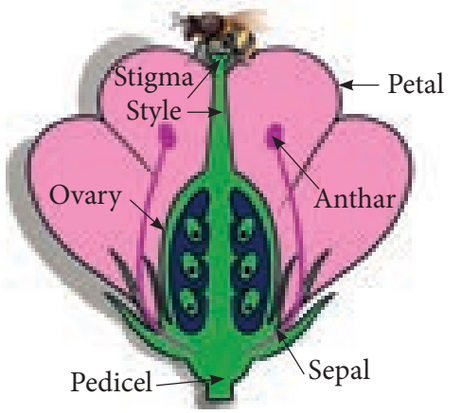
Make a flower album

Collect some flowers and press them between pages of newspaper or book. Place two thick sheets and keep a heavy object, such as brick, on the top to apply pressure. Turn the sides every two to three days. Allow flowers to dry completely. Collect the dried flowers and paste them in an album. Now, your flower album is ready.

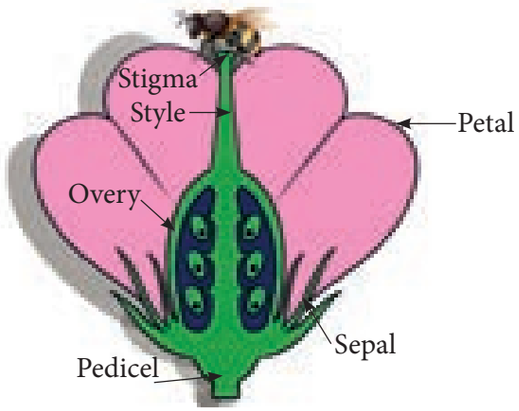
ACTIVITY 5

Using the information from the above diagram complete the following table:

Name of the flower	Complete / Incomplete	Unisexual / Bisexual	Male / Female
Hibiscus			
Pumpkin			
Rose			
Coconut			
Jasmine			



Bisexual Flower



Unisexual Flower

5.2.3 Pollination

We know that flowers of pumpkin are unisexual - that is some flowers are male while many are female flowers. We can easily identify the male and female flower of pumpkin, even before the buds bloom. To understand how a flower develops into fruit, let us perform an experiment on pumpkin plant.

ACTIVITY 6

Once flower buds appear, immediately identify ten female flower buds from a pumpkin plant. Tie a plastic bag around each bud so that no outside material can enter inside. Ensure to make small holes with a pin to allow air flow. Wait for two to three days to bloom.

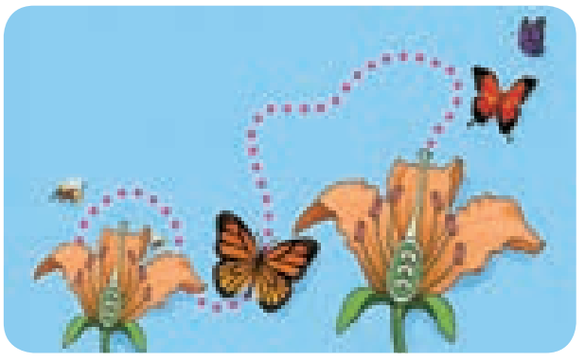
Female

Male

Choose three to four male flowers. Pluck the stamens of these flowers and dust the pollen grains in a sheet of paper and collect it. Open five out of ten bags containing female flowers. Brush the collected pollen grains on the stigma with a soft paint brush. Take care not to damage the stigma. After few days we can see that flower in all bags that were not opened at all would wilt without forming a fruit, while most of the flowers to which pollens have been applied bear fruits.

The process by which pollen grains reach stigma is called as **pollination**. The flower that receives pollen grains is called pollinated flower while the one that did not receive pollen grains is called as unpollinated flower.

In the above experiment we transferred the pollen grains from male flower to the female flower. This is called as an **artificial pollination**. However, in nature there are many ways in which pollen grains reach the stigma of the flower and it is called as **natural pollination.**

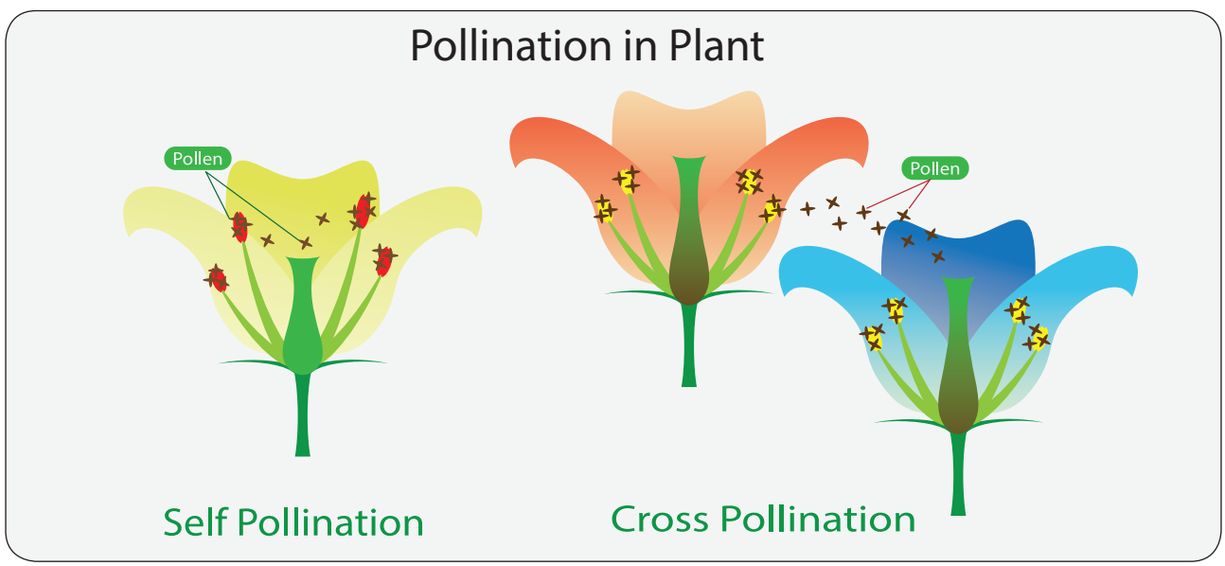


In some plants like grasses, pollen grains are light. Stamens shed pollen grains, and are carried by wind to other flower. Insects, birds are also agents of pollination. Bees, butterflies and variety of birds hover around flowers. They help to carry pollen from one flower to another. Pollen grains stick to their legs, wings or abdomen when they move from one flower to another. This is called as **cross pollination**

When you shake stamens, pollen grains fall. Thus, when wind shakes the flower or when a butterfly agitates the flower, pollen grains could fall onto the stigma of the same flower. Some plants that have both the male and female parts within a single flower (bisexual) pollinate by this means. This is called as **self pollination**.

Table 5.1 Differences between self pollination and cross pollination.

Self Pollination	Cross Pollination
Pollen grains are transferred from the anther to the stigma of the same flower or to another flower of the same plant.	Pollen grains are transferred from the anther of one flower to the stigma of another flower of the same kind or different plant.
Plants do not need to produce pollen grains in a large quantity for self pollination	Plants need to produce pollen grains in larger quantities to increase the chance of pollination.
It does not produce changes in the characteristics of new plants.	Cross pollination does introduce variations in the characteristics of new plants.



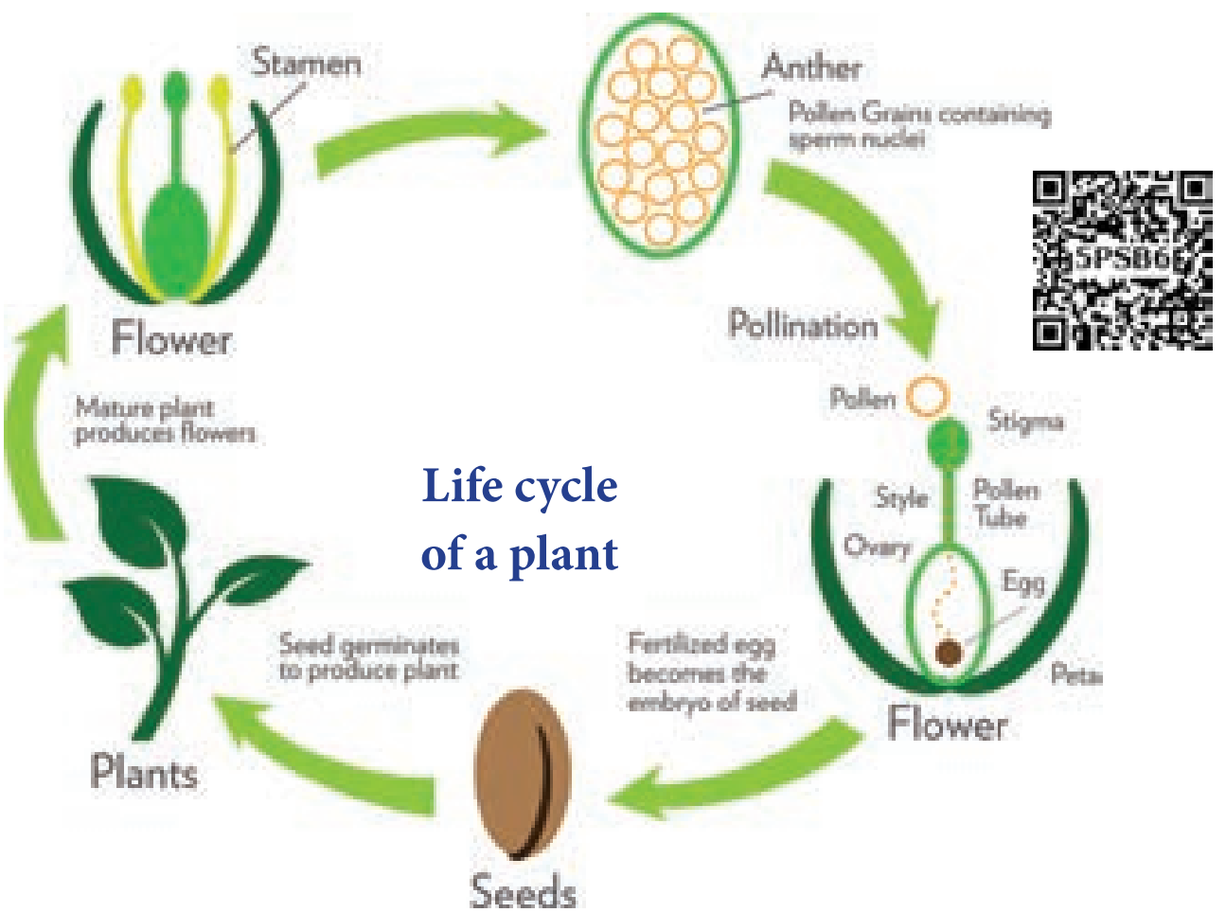
Beans (Fabaceae) and tomatoes (Solanaceae) commonly self-pollinate. Even though, for example, tomato self pollinate, they need the help of the insects to create vibrations within the flowers that will effectively loosen the pollen. Paddy is mostly self pollinating using just gentle wind as the pollinating agent. The agents that are helping in pollination are called **pollinators.**

In many plants, pollens have to come from some other flowers. This is obvious in case of plants which have distinct male and female flowers like pumpkin. In some flowers the gynoecium matures first before the androecium shed pollens. Such plants need cross pollination. Plants such as apples, plums, strawberries, pumpkins use insects for cross-pollination.

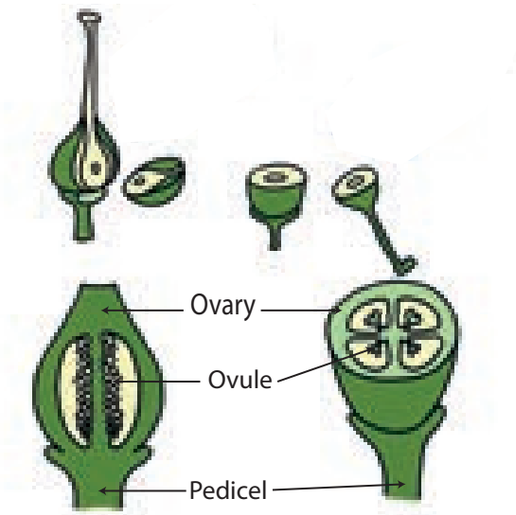
5.2.4 Fertilization

During pollination, pollen grains reach stigma. What happens to them after this? Substances produced on the stigma causes the pollen grain to germinate. During the germination a tube develops from the pollen grain which carries male gametes and ultimately reaches female gamete inside the ovary through the style. Male gamete fuses with the female gamete to form zygote. This process is known as **fertilization.**

Where is this female gamete located? Inside the ovary, small rounded structures, ovules are present. In these ovules, female gamete is present. To know more about this, we should cut ovary of a flower in longitudinal and transverse ways.



Cut a ovary of a flower both vertically and horizontally. Observe the ovules. Compare the ovary and ovules from few different flowers. Are there one or more ovules? Can you see any connection between the number of ovules in the ovary and number of seeds in each fruit?



Longitudinal Section of an Ovary **Transverse Section of an Ovary**

Collect some fruits like tomato, brinjal, lady's finger (vegetable), mango, peas and custard apple and observe. You can see some green part above brinjal and lady's finger. What are they?

Compare mango, custard apple and peas. All these are single fruits but custard apple has many small parts in it, each with a seed. Mango has a single seed and pea has many seeds. What do you understand from the above observations?

- A green part above fruits of **brinjal** and **lady's finger** are sepals of a flower. In some plants, after fertilization, sepal will not fall from fruit and remain or persist with fruit.
- **Custard apple** is made up of many fruits, aggregated together. Each fruit part is thin, membranous with some granule like, which is edible.
- In **mango** the outer skin and middle pulpy are edible and sweet. The inner most part is with single seed.
- In **pea** the fruit is not fleshy, but forms a covering pouch for many seeds.

In all the above fruits, ovary, a lower most swollen part of pistil develops into a fleshy fruit. Ovules present inside the ovary gets transformed into a seed.

Hence, now with these observations, we shall list the changes taking place in a flower after fertilization. These are collectively said to be **post fertilization changes**

- ❖ Calyx sometimes persist with fruit.
- ❖ Petals wither / fall off.
- ❖ Androecium fall off.
- ❖ Pistil remain and develops into a fruit.
- ❖ Style and stigma fall off
- ❖ Ovary enlarges to store food materials and develops into a fruit.
- ❖ Ovules present inside the ovary develops into seeds.

The world's largest and heaviest seed is the double coconut. The seed looks like two coconut fused together. It grows only in two islands of the Seychelles. A single seed may be 12 inches long, nearly 3 feet in circumference and weighs about 18 kg.

Orchids have the smallest seeds in the plant kingdom. 35 million seeds may weight only about 25 gram.

5.3 Asexual reproduction

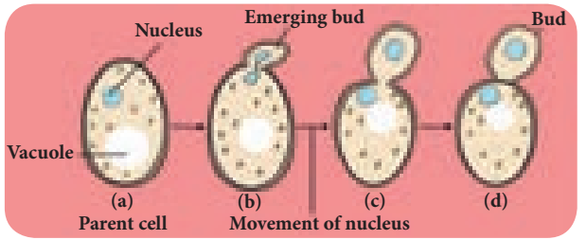
We saw that plants reproduce not only from seeds but by other processes as well. The production of new plants without the involvement of pollination and fertilization is known as asexual reproduction. Let us study the types of asexual reproduction.

5.3.1 Vegetative Propagation

In potato, shoot arise from eyes. Sugar cane and yam also grow like this. Vegetative parts of the plants such as root, stem and leaves can help to produce the plant.

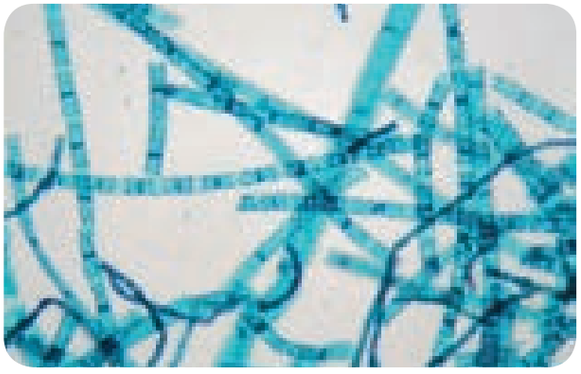
5.3.2 Budding

When we go to a bakery we see so many types of cakes and breads. These are very soft in nature. This is due to the presence of yeast. Single yeast undergoes asymmetric division. It produces a small protuberance which gradually grow and detach from the parent cell. This process is called **budding**.



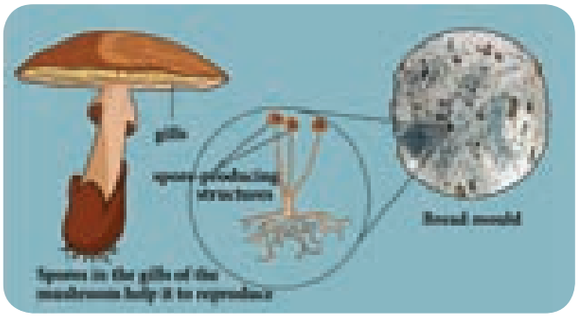
5.3.3 Fragmentation

In a pond we see so many algae. **Spirogyra** is a filamentous alga. When it matures, the filament divides into pieces. Each fragment or piece of a filament will grow into a new filament or individual. Likewise **spirogyra** produces so many young ones and this process is known as **fragmentation.**



5.3.4 Spore Formation

Scarcity of water, high temperature, nutrient deficiency in soil etc., are unfavourable conditions. During these conditions non-flowering plants like algae, fungi, moss and ferns produce spores. They germinate into a new plant when favourable conditions return.



5.4 Modifications of plant parts

Compare the given plants and discuss with your teacher.

Carrot Plant

Grass

Onion

Potato

Carefully remove a fresh carrot plant from the soil and observe it. Look at the part we usually consume as 'carrot vegetable'. It is not a unripe fruit, but the tap root of the carrot plant. We can see that the tap root of the carrot is swollen. In the case of the carrot plant, the tap root has a different characteristics than the usual plants. Normally, each plant organ originally evolves to meet certain needs of the plant. For example, roots evolve primarily to anchor the plant and also to absorb water and mineral nutrients from the soil.

Leaves are adapted to optimize photosynthesis. Stems evolve to reach out to sunlight and also to conduct water from roots to leaves. However in certain plant species, specific parts have evolved further in unusual and surprising ways to meet certain other specific needs, In some plants, root, stem, and leaves change their shape and structure to perform special functions like storage of food, mechanical support, protection and other vital functions. This is known as modification.

What appear as the 'leaf' of a cacti are actually their stem and what appear as 'spine' on them are actually leaf. Its leaves are modified into spines, an adaptation to reduce transpiration. Photosynthesis is performed by the stem part of the plant. In this section let us study about the modification of root, stem and leaves.

5.4.1 Modification of Root

a. Roots for storage

Look at radish, turnip, beet root, and carrot. They all grow under the soil. As soon as you pluck it from the ground if you wash them gently, you will notice small roots dangling from their surface. All these vegetables are in fact roots of the plant. Instead of thin slender roots, they have become a place to store the food produced by them. Hence, they are thick and swollen. One can notice that the tap root of radish is in the shape of spindle, swollen in the middle and tapering at both ends. Such type of modified roots are called spindle shaped root.

Radish

At times, like in the case of turnip and beet root, the tap root can acquire a shape of top, that is spherical at the base and tapering shortly towards the apex. They are called as top shaped root.

Beet Root

In case of **carrot,** the shape is conical, broad at the apex and tapering gradually towards the base and such modified roots are called conical shaped root.

Carrot

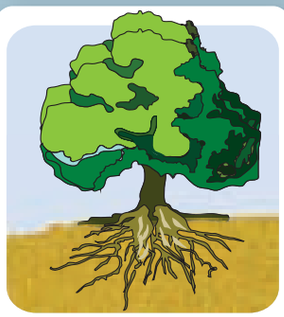
PLANT MODIFICATION

Modification of Root

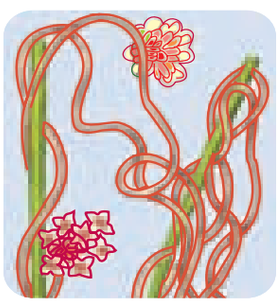
To perform special functions the roots change their size and shape.

STORAGE OF FOOD
e.g. Beet root

MECHANICAL SUPPORT
e.g. Banyan tree



GASES EXCHANGE
e.g. Avicennia

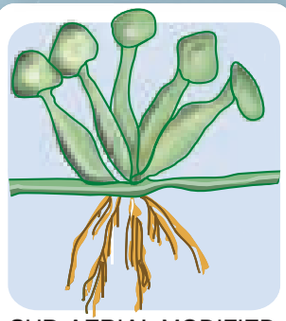


SUCKING ROOT
e.g.Cuscuta

Modification of stem

Stem modified for storing the food materials and for vegetative propagation.

AERIAL MODIFIED
e.g. Cactus

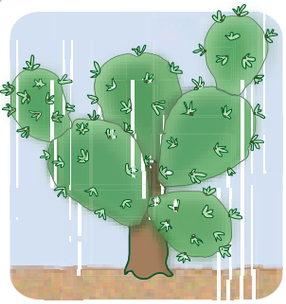


SUB-AERIAL MODIFIED
e.g. Eichhornia

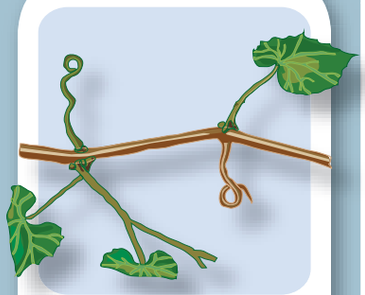
UNDERGROUND STEM
e.g. ColoCasia

Modification of Leaf

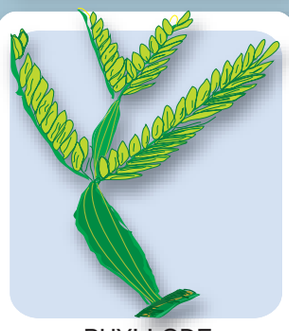
Leaves have changed themselves to adopt to their environment



SPINES
e.g.Opuntia



TENDRILS
e.g.Pisum



PHYLLODE
e.g. Acacia

TRAPS
e.g. Nepenthus

ACTIVITY 7

Aim: To study the modification of root.

Materials Required: Sample / Charts of radish, carrot, beet root, sweet potato, stilt roots and pneumatophores.

Procedure: Carefully observe the shape of each specimen.

Observation: Draw the diagram and observe the morphological differences between the samples.

b. Mechanical Support

Look at a banyan tree. It seems to have many trunk, supporting it. However many of them are actually roots. As the banyan tree is large and huge, it needs support so that it does not tilt and fall down. Many plants require such additional support. Such plants develop roots on their aerial parts to provide mechanical support. These roots grow downward and act as supportive organs. There are three types of modified roots for support.

Prop roots

Roots are modified to provide mechanical support as seen in banyan tree. These roots grow vertically from horizontal branches of a tree.

Banyan

Stilt roots

In sugar cane and maize, adventitious roots arise from the nodes in cluster at the base of the stem. These roots are called stilt roots which give additional support.

Sugar cane

Climbing roots

In betel and black pepper, nodes or internodes bear roots which help in climbing.

Betel

DO YOU KNOW?

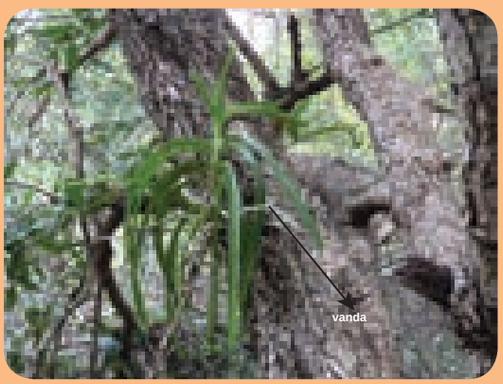
A root growing from a location other than the underground, such as from a stem or leaf is called as adventitious root

c. Breathing roots or Respiratory roots

Avicennia is a tree which grows in mangroves or swamps. They have roots which are seen above the ground for the purpose of gaseous exchange. These roots are erect, peg like structures with numerous pores through which air circulates. These roots are called **breathing roots or pneumatophores.**

Avicennia

Vanda is an epiphytic plant, which grows on trees. The velamen tissue present in the epiphytic root absorbs moisture to perform photosynthesis.



Vanda

d. Haustorial roots

Roots may also perform some special functions. Haustoria or **sucking roots**, are one such example. Cuscuta a parasite plant, climb the trees and other vegetation and use the haustorial roots to penetrate the tissue of the host plant and suck nutrients from them. They are usually found in parasitic plants that depend on the host plants for nutrients.

Cuscuta

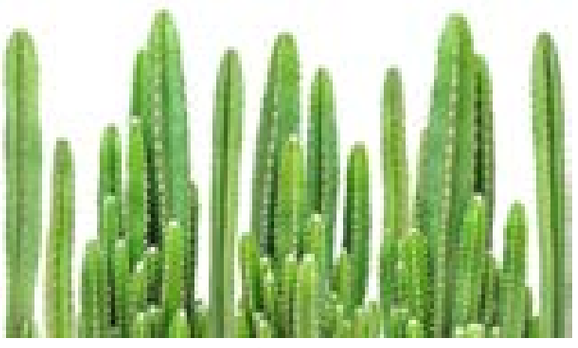
5.4.2 Modification of stems

Can you guess what is common between ginger, onion bulb and potatoes. All three are stems. Some plants have their stems modified for storing food and for vegetative propagation. Modified stem may be aerial, subaerial or underground stems.

a. Aerial Modifications

Phylloclade

In dry climate, conserving water is a challenge. Water evaporates from the surface. If the surface area is larger, evaporation would be more and if the surface area is smaller, the evaporation will be less. Plants with many leaves have more surface area. **Cactus** hence



Cactus

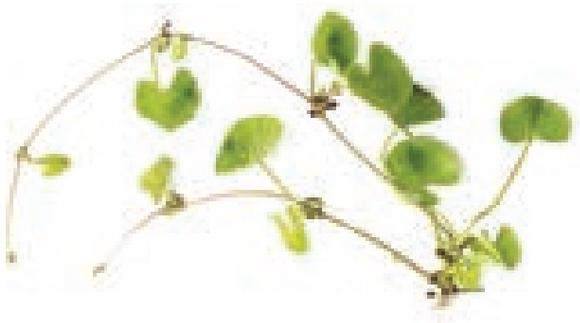
has a thick stem which does most of the food production through photosynthesis and leaves are reduced to small spines with less surface area.

b. Sub – aerial Modifications

Stem of some plants remains sub – aerial which grow horizontally on the surface of the soil for the purpose of reproduction. There are four types.

Runner

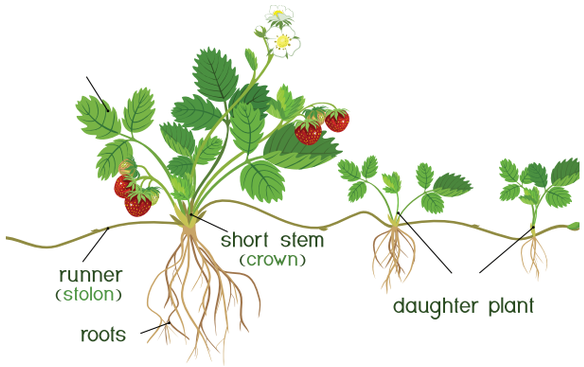
The stem which grows laterally on the surface of the soil, breaks up to produce roots where it touches the ground to give rise **to new plants. E.g. Centella (Vallarai)**



Centella

Stolon

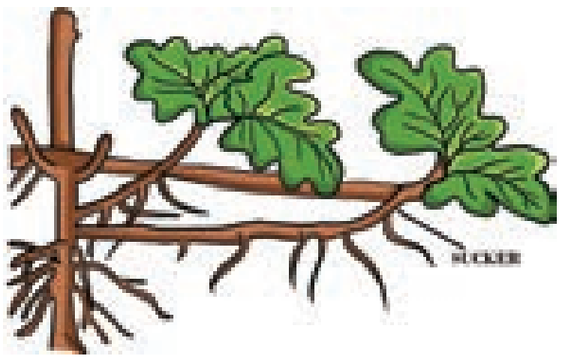
Stolon is a slender branch of the stem that grows upwards to some distance and then bends towards the ground. Upon touching the ground, it gives rise to a new plant. **E.g. Wild strawberry**



Wild strawberry

Sucker

Sucker is a short and weak lateral branch that grows diagonally upwards and directly gives rise to a new shoot. **E.g. Chrysanthemum**



Chrysanthemum

Offset

An offset is a short and thick branch that arises from the axial part of a leaf. It has thick internodes. It produces a tuft of leaves and cluster of small roots below. **E.g. Eichhornia**

Eichhornia

c. Underground modifications

In aerial and sub aerial modifications, stem has indefinite growth. In underground modified stem, whole stem is burried under the ground and it has definite growth. Usually stem grows above the ground, but there are some stems that grow under the ground to store food. These underground stems swell and become thick. There are four types of underground stems. They are:

1. Rhizome
2. Corm
3. Tuber
4. Bulb

1. Rhizom

It is an underground thick stem with nodes and internodes with scale leaves at the node. It grows horizontally and has an irregular shape. Rhizome have buds. It gives rise to new stem and leaves. **E.g. Ginger and Turmeric**

Turmeric

2. Corm

This underground stem is round in shape and flat at the top and bottom. It is a condensed form of rhizome and bears one or more buds in the axils of scale leaves. Daughter plants arise from their buds. **E.g. Colocasia**

Colocasia

3. Tuber

It is an enlarged, spherical underground stem that stores food. It has many dormant buds on its surface known as 'eyes'. If we plant a part of tuber with the bud, it grows into a new plant. **E.g. Potato**

Potato

4. Bulb

It is a condensed stem which is disc like and stores food in the fleshy leaves. The bulb has two types of leaves.

- Fleshy Leaves
- Scaly Leaves

The upper part of the stem has a terminal bud and it is covered by many scaly leaves. The inner fleshy leaves store food as seen in garlic and onion.

Onion

ACTIVITY 8

Aim: To study the modification of stem

Materials Required: Specimens of ginger, potato, onion, mint, bougainvillea, acacia, opuntia and locally available specimens.

Procedure: Observe the external morphology of each specimen.

Observation: Draw diagram and bring out the differences and their function in each type of stem modifications.

5.4.3 Modifications of Leaf

Plants have changed themselves to adapt to the environment they grow. One of them is the modification of leaves. Leaves of several plants get modified into different form based on the purpose and environment.

1. Spines

Leaves are reduced to spines, and the stem is modified into green succulent part to perform photosynthesis. **Eg. Opuntia**

Opuntia

2. Tendrils

In climbers, the leaf of plant are modified into elongated structure to help the plants climb efficiently.

- ***Gloriosa superba*** – Leaf tips are modified into tendrils.
- ***Pisum sativum (Pea)*** –Terminal leaflets are modified into tendrils.

Pisum sativum

3. Phyllode

In Acacia auriculiformis, petioles expand to form leaf like structure. They carry out the function of leaf (Photosynthesis).

Acacia

4. Traps

Plants that grow in nitrogen deficient places adapt themselves well to get it. In **Nepenthes,** the leaves are modified into a flask like structure, which is used to attract insects and other tiny animals. The inner wall of the leaf secretes digestive enzymes that help to digest the insects and extract the nitrogen needed for the plant.

Nepenthes

Points to Remember

- ❖ Reproduction is an essential function of living organisms. In plants there are two types of reproduction – asexual reproduction and sexual reproduction.
- ❖ In flowering plants, flowers are the reproductive organs. They produce fruits and seeds through pollination and fertilization.
- ❖ The male reproductive organ of a flower is androecium and the female reproductive organ of a flower is gynoecium.
- ❖ Transfer of pollen grains from the anther to stigma is called pollination. There are two types of pollination - self pollination and cross pollination.

- ❖ Agents like wind, water, insects and animals are helpful for pollination and are known as pollinators.
- ❖ After pollination, the fusion of male and female gametes takes place. It is called fertilization. After fertilization, ovary becomes the fruit and ovule becomes the seed.
- ❖ To perform the special function other than the normal function, the root, stem and leaf externally modify themselves according to the environment. So, they change their size, shape and colour. These are called the modification of root, stem and leaves.

Evaluation

I. Choose the appropriate answer.

1. Vegetative propagation by leaves takes place in
   a. bryophyllum b. fungi
   c. virus d. bacteria
2. Asexual reproduction in yeast is
   a. spore formation b. fragmentation
   c. pollination d. budding
3. Reproductive part of a plant is
   a. root b. stem c. leaf d. flower
4. Pollinators are
   a. wind b. water c. insect d. All the above
5. Climbing roots are seen in
   a. betel b. black pepper
   c. Both of them d. None of them

II. Fill in the blanks.

1. The male reproductive part of a flower is _____.
2. _____ is the basal swollen part of the gynoecium.
3. After fertilization the ovule becomes _____.
4. Breathing roots are seen in _____ plants.
5. Onion and garlic are example for _____.

III. State true or false. If false, correct the statement.

1. A complete flower has four whorls.
2. The transfer of pollen to the stigma is known as pollination.
3. Conical shaped root is carrot.
4. Ginger is an underground root.
5. Leaves of aloe vera are fleshy and store water.

IV. Match the following

Petal	Opuntia
Fern	Chrysanthemum
Phylloclade	Attracts insect
Hooks	Spore
Sucker	Bignonia

V. Answer very briefly.

1. Write two types of reproduction in plants.
2. What are the two important parts of a flower?
3. Define – Pollination.
4. What are the agents of pollination?
5. Give example for Corm and Tuber
6. What is tendril?
7. What are thorns?

VI. Answer briefly.

1. Differentiate bisexual flower from unisexual flower?
2. What is cross pollination?
3. Write notes on phyllode.

VII. Answer in detail.

1. Write a brief account on pollination.
2. Explain the underground stems.

VIII. Higher Order Questions.

1. Ginger is considered to be a stem, not a root. Why?
2. What will happen if pollen grain of rose gets deposited on stigma of lily flower? Will pollen germination takes place? Why?

IX. Consider the following statements and choose the correct one.

1. **Assertion**: Pollination and fertilization in flowers produce fruits and seeds.

   Reason: After fertilization the ovary becomes fruit and ovule becomes seed.

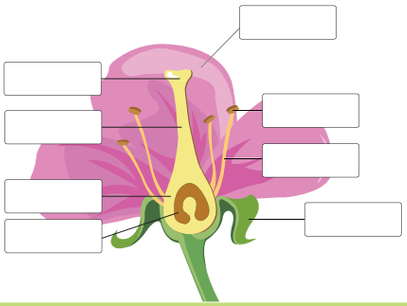
2. **Assertion**: An example for conical root is carrot.

   Reason: It is an adventitious root modification.

a. Assertion is incorrect, Reasoning is correct.
b. Assertion is incorrect, Reasoning is incorrect.
c. Assertion is correct, Reasoning is correct.
d. Assertion is correct, Reasoning is incorrect.

X. Picture based question.

i. Label the picture given below.



Stigma Pistil Filament Ovule Sepal Stamen
Petal Style Anther Ovary

ii. Identify the four plants shown in the following table. Name the different modifications in each of them.

Name	Modification
Garlic	
Turnip	
Rose plant	
Maize	

ICT CORNER

Reproduction and Modification in Plants

Let's label the parts of the flower.

PROCEDURE :

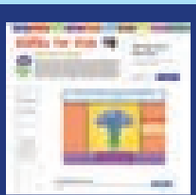
Step 1: Use the URL to reach stimulation page. Click 'Run adobe flash' to launch the simulation.

Step 2: Select 'OK' button to run the activity.

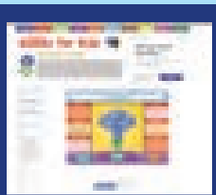
Step 3: Drag a Stamen into the labelled box. Then click 'OK' button.

Step 4: Read the instructions at the top of the screen to do the activity.

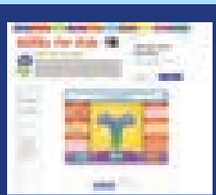
Step 5: Click 'Reset' to refresh.



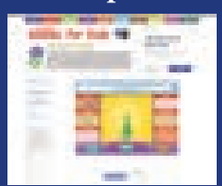
Step 1



Step 2



Step 3



Step 4

Reproduction plants URL:

http://www.sciencekids.co.nz/gamesactivities/lifecycles.html

*Pictures are indicative only

*If browser requires, allow Flash Player or Java Script to load the page.