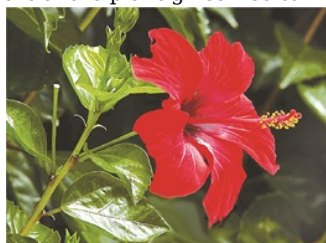


12.REPRODUCTION IN PLANTS

During spring season our surroundings are filled with the fragrance of flowers. Almost every plant around has flowers on it! We see a wide variety of flowers then.

We have already studied the different parts of plants in class VI.

- Let us write down names of the parts of plants that we have studied so far.
- Is there any part that you haven't studied about earlier?
- Do you know which part of the plant gives rise to fruit?



Flowers are usually the most attractive part of any plant. Why do you think flowers are so attractive and colourful?

What role do flowers play in a plant's life?

Let us study some flowers around us to answer these questions.

Let us do - 1

Collect flower of say, Datura, Chinrose (Hibiscus), Cucumber, Bottle gourd, Tridax, Sun flower, Ipomea etc. Observe these flowers. Are they of the same size and shape? Try to draw the flowers collected and write their names if you know them. We shall now study the Datura flower to know more about the parts present in a flower (floral parts). Try to draw its shape in your note book.

Thalamus

Let us hold a Datura flower by its stalk. This stalk is green in colour and has a slightly swollen head. This is called **thalamus**. It is the seat on which the parts of a flower are present.



Calyx:

Now let us observe the part that comes just above the thalamus. There is a green tube like structure called **calyx**. The edges on the part towards the petals

have thin leaf like structures called **sepals**. The lower ends of sepals are fused to form the tube like structure. Remove the tube of fused sepals carefully. What do you see after removing the sepals?

Corolla:

There is a funnel shaped corolla. This is formed of fused petals. Count the free edges of these. How many are there? What is the colour of the petals? Remove this funnel shaped corolla as well. Observe and draw the same in your note book.

Androecium:

After removing the petals you can see soft elongated structures attached to these petals. They are called stamens. How many stamens do you see?

There is a bulb like structure at the top of each stamen that is called pollen sac or anther. Just below it a fine whitish thread like structure called filament attaches the anther to the petal (in Datura). So stamen has an elongated filament and a bulb like pollen sac. How many stamens are there? Stamens of the flowers are together called the male part or androecium. Draw the picture of stamen as seen by you.

Gynoecium:

As we remove petals, right on the thalamus is seated a bulb like structure called ovary. Just above it a fine tube like structure called style goes up ending in a somewhat flat bead like structure called stigma. This whole structure from ovary to stigma is the pistil or one female reproductive part. All the parts present on the pistil together called as gynoecium.

Draw the picture of pistil which you observe. How many pistils are there in Datura?

We observe that flower parts are arranged in definite circles or whorls. Note your observations regarding the different types of flowers collected by you.

Write your observation in the given table.

Circle	Name of the Circle	Parts you observed in the circle

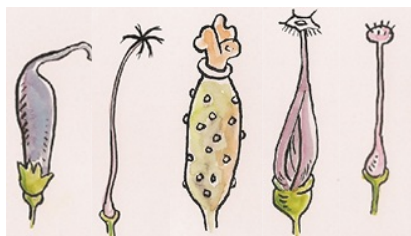
Let us observe male parts (Androecium) and female parts (Gynoecium) of different flowers that you have collected.

Observe stamen and pollen sac or anther of the flowers. Are they of the same size and shape? Observe various types of stamens of different flowers.



types of stemens

Let us observe female parts like ovary, style, stigma of different flowers that you have collected. How are they? Like male parts, female parts also differ from flower to flower. Observe various types of pistils of different flowers.



Types of pistil

Draw the diagram of flower you have dissected compare it with the diagram given below:



Do all flowers have four parts?

Let us do - 2

Collect as many flowers from your surroundings as you can. See that you have at least a type of melon or gourd flower as well. Now observe different parts in each flower. Record your observations in the table given below. (You may also record your observation regarding the flowers already collected by you earlier in this chapter).

S.No.	Name of the Flower	No. of Sepals (Calyx)	No. of Petals (Corolla)	No. of Stamens (Androecium)	No. of Pistil (Gynoecium)

- In the case of cucumber or bottle gourd, do they have all four parts in each flower?

In Cucumber and Bottle gourd you will probably find two types of flowers on each. Examine them carefully. Take the help of the figure given below and find out the difference between the two.



Fig. 6

Do you know any other plants which have separate male and female flowers? Give examples.

What do you see in sunflower? It looks like a single flower. But is actually a bunch of flowers. The small flowers in the bunch are called 'florets'. The florets in the centre are called disc florets. The florets along the rim are called ray flowers. You will learn more about such special flowers in higher classes.

Flowers may be classified on the basis of number of parts present in them as-

Complete flower:



A flower that has four or more whorls - at least one each of calyx (sepals), Corolla (petals), Androecium (stamens) and Gynoecium (pistil) is called a Complete flower. Eg: datura, ipomoea, hibiscus.

Incomplete flower:



A flower in which any of these four whorls is missing is an Incomplete flower. Eg: cucumber, bottle gourd, papaya.

Unisexual flower:



A flower which has either stamens (androecium) or pistil (gynoecium) is called unisexual flower. Eg:- cucumber, bottle gourd, bitter gourd etc.,)

Is an unisexual flower a complete flower? Why not?

Bisexual flower:



A flower that has both stamens and pistil (androecium and gynoecium). Eg:- Datura, hibiscus, Ipomea, is called bisexual. Are both unisexual flowers found always on the same plant? Try to find out about bottle gourd, watermelon and papaya or any other plant bearing unisexual flower, whether the male and female flowers are born on the same plant or on separate plants?

Collect hibiscus, cucumber, bitter gourd, datura, ipomea, bottle gourd flowers etc. Observe the different parts in them. Record your observations in the table (see if you can collect all these, in case you can't, take the help of books present in your school library or elsewhere.

S. No.	Name of the Flower	Complete/ In Complete Flower	Unsexual / Bisexual Flower	Male / Female Both
1	Hibiscus			
2	Dutara			
3	Ipomea			
4	Cucumber			
5	Bottle Gourd			
6	Bitter Gourd			

Sexual parts of flower:

Now take a stamen (androecium) from the datura flower; tap the stamen gently on a slide. You can see some grains fallen on the slide. Put a drop of water and observe these grains under the microscope.

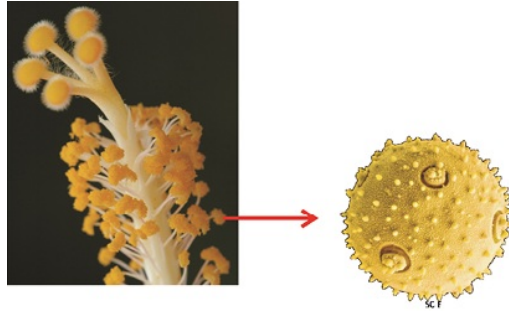


Fig. 7

These grains are called pollen grains. Collect pollen grains from other flowers and observe under the microscope as well. Are all these of same shape and colour? Draw the different pollen grains as you see them under the microscope.

Take the pistil of a datura flower as it is big enough to observe the internal parts.

Cut the sections of the ovary of pistil as shown in figures 8 a and 8 b.



Fig. 8a. T.S of ovary



Fig. 8b L.S of ovary

With the help of hand lens study the internal parts. What do you see? Some small ball like structures called "ovules" can be seen arranged in different chambers.

Now take pistils of other flowers as well one by one, and cut the ovary of them and observe. Draw the diagram of the section of ovary that you have observed.

Flower part to Fruit

Let us do - 3

Collect a pistil and fruit from datura plant. Cut the transverse section of both ovary of pistil and fruit. Observe the internal structure of both the section cuttings with the help of a hand lens. Are there any similarities between these two?



Fig.9 T.S of Fruit of Datura

Collect pistil and fruit of cucumber, bhendi (Ladies finger), cotton and beans and do the above activity. Write your observations. What similarities do you see between the ovary and fruit of the same species?

It is reasonable to conclude that an ovary develops into a fruit while the ovules develop into seeds. The seeds further produce new plants.

Agents that help ovary of flower to develop into fruit

Let us do - 4





Observe a bottle gourd plant in a garden. It has unisexual flowers i.e. male and female flowers separately. Select 10 female buds of bottle guard, cover with a polythene bag loosely tying the bag on a stalk. Make some tiny holes in the bag with the help of a pin.

Two days later observe the buds blooming. (Now collect the pollen grains from a male flower of the Bottle gourd plant). Pluck the stamens of male flower and shake to collect pollen grain in a sheet of paper. Twisting cotton wool over the tip of a match stick prepares a brush. Now uncover five of the ten female flowers. Apply the pollen grains on to the stigma of these flowers with the brush. The pollen grains stick to the stigma. Cover the flowers again with polythene bag. Remove all male flowers from the plant. So that no pollen grain reaches the remaining female flowers.

The process of pollen grains reaching the stigma from anther is known as **pollination**.

After one week observe both pollinated and non-pollinated flowers. Pollinated flowers develop into fruits where as non-pollinated flowers do not.

- Why is it necessary to begin this experiment with buds in which petals are closed?
- Why are the buds enclosed in polythene bags?
- Why are the non-pollinated flowers also covered with polythene bags?

By this experiment we come to know that significant role is played by male flower in the formation of fruit.

If transfer of pollen grains take place within the flower it is known as Self Pollination. Transfer of pollen grain from anther of one flower to stigma of another flower of same species in called Cross Pollination.

Agents of Pollination:

How do these pollen grains fall on the stigma? Air, water, animals, insects, humans act as agents of pollination. They carry pollen grains from anther to the stigma. Insects like butterflies suck nectar from flowers. At that time pollen grains of that flower stick to the legs of the butterfly. When the butterfly goes to another flower for nectar, the pollen grain that have stuck to it's legs fall on that flower.

Do you know:

Birds and insects are the natural agents for pollination. Now-a-days farmers use pesticides to control pests on crops. The enormous use of pesticides kills insects also. It effects pollination. Crop yield become reduced particularly in sun flower crop. The rate of pollination is reduced because of lack of insects in the fields.. Think! How we destroy our beautiful nature.

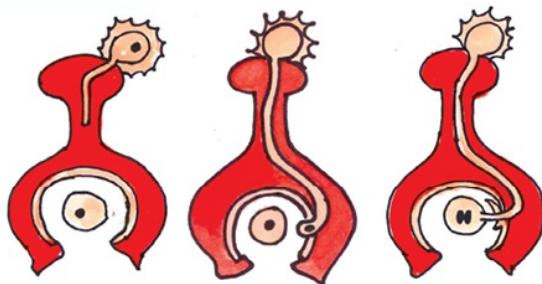
What happens to the pollen grain after Pollination?

Let us do - 5

Take two slides. Put 2-3 drops of water on them. Add some sugar grains to water on one slide. Now put some pollen grains of Hibiscus flower on both the slides. After one hour observe under microscope. In which slide do pollen grains germinate and why?

There are some substances present on the stigma which promote the germination of the pollen grains. During germination a tube grows from the pollen grain. This tube ultimately reaches the ovary through the style with the male part. This male part fuses with the female part in the ovule of the ovary. Fusion of units of male and female parts to form a structure called as zygote is called **Fertilization**.

After fertilization seed develops from the ovule and the ovary usually develops into a fruit. The entire process of fertilization and formation of zygote is known as Sexual reproduction. For the formation of a seed sexual reproduction is essential. The seed thus formed are dispersed to different places by agents like air, water, birds and animals and by human beings as well. These seeds grow into new plants under favourable conditions.



Production of baby plants or offsprings from the zygote is called **sexual reproduction**

We often find that some plants grow from their cuttings or some other parts. Can you name some such plants?

S.No.	Name of the plant	Plant part from which new plant produced
1		

Reproduction of plants from all such parts other than the flower is asexual reproduction.

Asexual reproduction:

The most interesting thing in plants is baby plants can grow even without formation of seeds that is without sexual reproduction. Let us study some such processes.

a. Vegetative reproduction

Production of new plants from vegetative parts of a plant i.e. root, stem and leaf is known as vegetative reproduction.

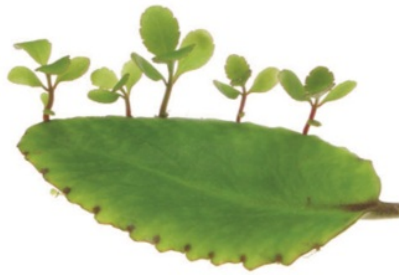
Let us do - 6

Do you know how farmers produce potatoes in their fields?



Take potato and observe it. It has a number of small depressions on its surface. These are known as eyes. Cut the potato into pieces such that there is an eye in each piece. Remove the eyes from some of these pieces. Fill two cups with soil. Plant the piece with eyes in one cup and label the cup as “with eyes” and those without eyes in another cup named as “without eyes”. Water both cups daily and observe what happens. In which cup do potato plants sprout?

Here is a picture of a plant called Bryophyllum.



You can see baby plants on the edge of the leaves. Can we say that the Bryophyllum plant reproduces through its leaves?

In our garden we grow plants like rose, hibiscus, and jasmine by cutting a small branch and planting them in the soil.

Which other plants can be grown from its cutting? (Name a few such plants)

Vegetative reproduction in some plants

Plant	Part of the plant
Sweet potato, dahlia, carrot, turnip, radish	New plants grow from the modified root.
Potato	New plants grow from eyes in the tuber which is a modified stem
Onion, garlic, tuberose, lilies, gladioli	New plants grow from bulbs, or corms (gladioli), which are modified stems.
Bryophyllum (sprout leaf plant), begonia	New plants grow from buds on the leaf
Sugarcane	Stem grows roots at the nodes
Mint, strawberry, chrysanthemum, raspberry	Stem creeps along the ground and strikes roots at the nodes.

b. Budding:

The jilebi maker adds something to the jilebi mix and leaves it for sometime. It helps him to make good jalebes. What he mixes is a type of plant called yeast. Yeasts grow with the help of a small bulb like outgrowth which increases in size and breaks off from the parent plant to live independently. This process of reproduction is called budding.



Fig. 14

Let us do - 7:

Take some water in a glass tumbler. Mix a tablespoon of sugar and half spoon of yeast powder you get in the market, in the glass tumbler. Cover the glass and leave it undisturbed for a day. On the next day place a drop of the solution on a slide and cover it with a cover slip and examine it under a microscope. You will be able to see budding yeast cells as shown in the figure 14 (they look like water bubbles growing new ones on them).

Let us do - 8 Take a slice of bread cover it with a vessel and leave it undisturbed for two or three days. Thereafter you will find the slice covered with grey coloured fungus called bread mould. Let it stand for three or four days. The whole growth appears like a black powder like matter. Transfer this powder with a thin stick on a fresh slice of moist bread. Observe what happens after every day and note your observation.(Fig 15)

The black powdery portion of bread mould contains several spores.

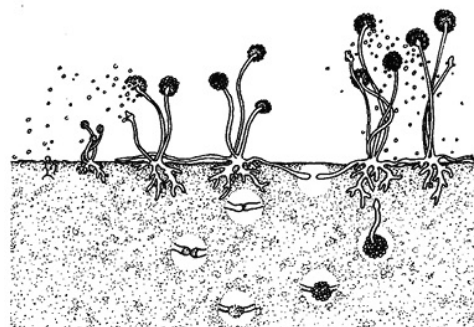


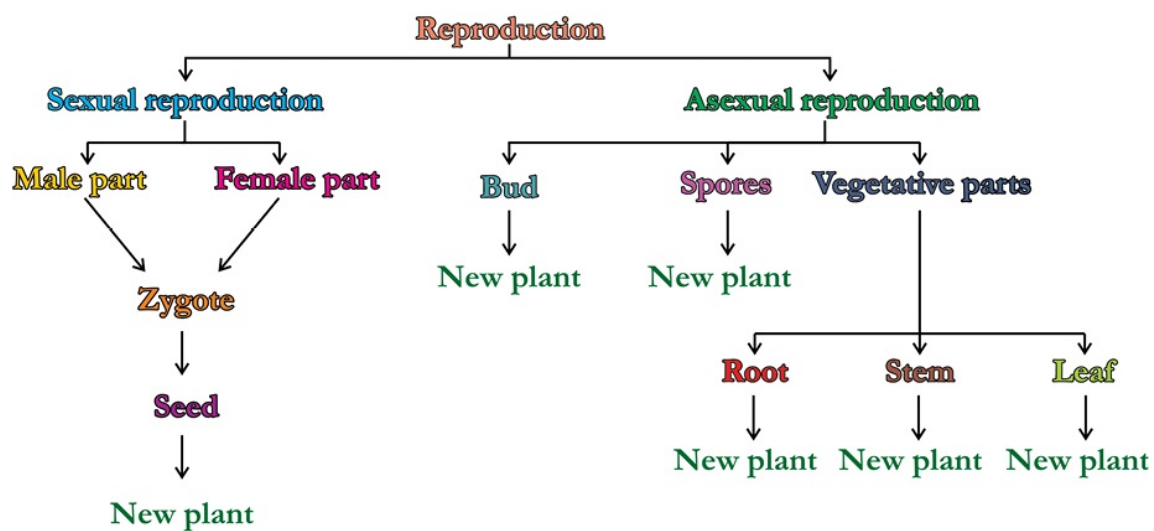
fig.15

Do you know!



Sir Alexander Fleming

Alexander Fleming a Scottish scientist, discovered that a certain kind of mould (Penicillium) produces a substance, named after the mould, called Penicillin, which can destroy many kinds of disease causing bacteria. Penicillin came to be known as an antibiotic and saved the lives of many soldiers in World War-II.



Key Words:

Cutting, Androecium, Gynoecium, Thalamus, Corolla, Calyx, Stamen, Pistil, Anther, Filament, Budding, Zygote, Vegetative Propagation, Spore, Pollination, Fertilization

What we have learnt

- Flower consists of four parts. Sepal, Petal, Stamen and Pistil.
- Based on presence and absence of floral parts flower are two types. Complete flower and Incomplete flower.
- Based on presence of both or single sexual parts flowers are of two types. Bisexual flowers and Unisexual flowers.
- Transfer of pollen grains from anther to stigma is known as pollination. Flowers can be self pollinated or cross pollinated.
- Fusion of male and female parts to form zygote is called Fertilization.
- On the basis of parts involved, reproduction in plants is of two types, sexual reproduction and asexual reproduction.
- Production of offspring from zygote is called sexual reproduction.
- Formation of new plants without sexual reproduction is Asexual reproduction.

Improve your learning

1. Do all flowers have same parts? Give examples of some flowers and explain your answer.
2. Differentiate between
 - a. Bisexual flowers, Unisexual flowers
 - b. Complete flower, incomplete flower
 - c. Male flower, female flower
 - d. Sexual reproduction, Asexual reproduction
 - e. Self pollination, Cross pollination
3. What happens when a pollen grain falls on

a stigma?

4. What helps to bring pollen grains to the stigma?

5. Explain the method of sexual reproduction in plants.

6. Can plants produce new plants even without seeds? Explain the methods with examples.

7. Draw the diagram of any flower showing its parts.

8. Do all plants reproduce in the same way? Explain with examples.

9. Karthik saw a cucumber plant in the kitchen garden. He identified two types of flowers-some flowers had a small swollen structure behind them while some did not. He removed all the flowers which did not have the swollen structure behind them thinking that they were of no use.

- Which flowers did he remove?

- What are the flowers which had a small fruit behind them?

10. What are the agents of pollination?

11. Differentiate between self pollination and cross pollination.

12. Name the parts of the following plants from which they propagate vegetatively.

a) Potato b) Bryophyllum

13. What am I?

a) I am formed by the fusion of male and female parts.

b) I am a part of the plant that can travel a long distance and grow to a baby plant.

14. Fill in the blanks

a) Flowers containing both male and female parts are called

b) Pollen grain from anther of one flower that reaches the stigma of another flower is called.....

c) From part of Bryophyllum new plants are produced

d) Agents of pollination are

e) Transfer of pollen grain from anther to stigma is called

15. Match the following

(1) Pollen grain () (a) Ovary

(2) Ovule () (b) Bryophyllum

(3) Reproduction through eyes () (c) Anther

(4) Reproduction through leaves () (d) Potato

16. Observe the following figures. What difference do you observe. Write in your note book.

