12 REPRODUCTION IN PLANTS

Organisms which are born, show growth, reach adulthood and live for some more time till after death attaining their maximum life span. How then a particular type of organism continue to exist? This is possible only through one of the most important life processes called multiplication or reproduction. All living organisms reproduce. What it means in simple terms is that living organisms produce young ones of their own kind. For examples, a cat produces kittens which grow into adult cats. In plants too, seeds grow into young seedlings. The seedlings in due course of time develop into mature plants, as in a mango tree.

Reproduction is one of the most important property of living organisms. It means creating new life, producing young ones of their own kind.

12.1. WHY LIVING ORGANISMS NEED TO REPRODUCE?

All living organisms have a fixed life span. During their life span, the organisms perform various life functions including reproduction. In an annual plant, for example, the life span is about one year, and in a perennial plant, it goes up to many years. Then the organisms die, leaving behind individuals of their own kind. This they ensure by reproducing during their life span. If they would not reproduce, then after their death, there would be no organism left. The species would thus perish.

Reproduction is thus, the means of perpetuation of species.

DO YOU KNOW ?

Do you know, at one time people thought that living things could come from dead (once alive) or non- living (never alive) matter. This was however, disproved subsequently.

12.2 MODES OF REPRODUCTION

How do you grow new plants?

You have studied about the structure of a flower. You also have studied that flowers produce seeds. Seeds are formed by the fusion of a male gamete with a female gamete. We sow these seeds and grow more plants of the

same type. This is the most common method of growing new plants. This type of reproduction is called **sexual reproduction.**

Can we grow new plants without seeds?

Yes, there are some plants which do grow without seeds. These plants give rise to new plants from a part of stem; root or leaf. These parts of the plants are called **vegetative parts.**

For example, a new plant of rose is produced by growing a cutting from one of its branches. This type of reproduction, which takes place without seeds, is called **asexual reproduction.**

Sexual reproduction is characterized by the fusion of two cells **(gametes)** usually coming from two parents. New plants are produced from seeds.

Asexual reproduction, on the other hand, is any type of reproduction that does not involve the union of gametes. New individual is produced from a single parent.

Methods of Asexual Reproduction

1. Fission-binary and multiple
2. Budding
3. Fragmentation
4. Spore formation
5. Regeneration
6. Vegetative propagation

12.3 ASEXUAL REPRODUCTION IN PLANTS

A. Binary fission

It is a most common method of asexual reproduction in which an organism divides into two. It is common among plants in unicellular organisms like bacteria **(Fig. 12.1)** and some algae and fungi. In this method, the organisms divide itself into almost two equal halves. Nucleus also divides into two parts. Each of the two parts then grows into full size.

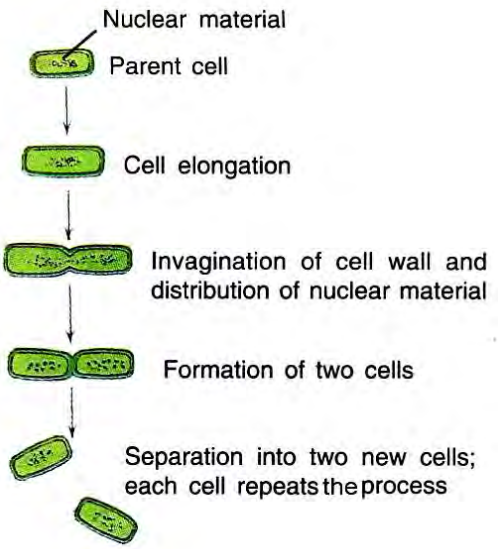

Fig. 12.1 : Binary Fission in Bacteria

B. Budding

Budding is commonly observed in yeast. A bulb-like projection, called the **bud,** is formed on the body. The nucleus

of the body divides into two. Then, one of the two nuclei passes into the bud. The bud detaches itself from the parent body. It grows to full size and becomes a new individual **(Fig. 12.2).**

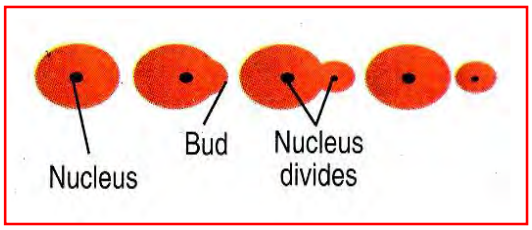

Fig. 12.2 : Budding in yeast

C. Fragmentation

In some filamentous organism such as Spirogyra (an alga), the filaments break up into two or more fragments **(Fig. 12.3).** Each fragment or piece grows into a new individual.

D. Spore formation

In non-flowering plants (the plants which do not produce seeds), like fungi (Mucor), bacteria, ferns or mosses, formation of spores is a common method of reproduction **(Fig. 12.4).**

Spores are very small, covered by very thick walls which help them to survive adverse conditions in the environment, like high temperature, scarcity of water and lack of food. The spores give rise to new organisms under favourable conditions.

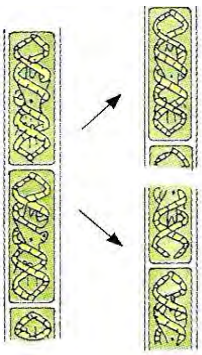

Fig. 12.3 : Fragmentation in Spirogyra

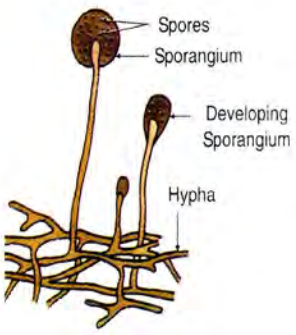

Fig. 12.4 : Spore formation in Mucor (a fungus)

E. Regeneration

In your garden, you mow the grass, and again next week, it needs mowing.

Each organism can repair itself in some or the other way. New cells grow to replace damaged or lost cells.

The ability of living things to repair them-selves or grow lost parts is called **regeneration.** Plants generally have greater powers of regeneration than animals do.

DO YOU KNOW ?

Every time you wash your hands, you wash off hundreds of skin cells. New skin cells are always being regenerated.

F. Vegetative Reproduction This is an asexual method of reproduction in plants where vegetative parts, namely, the root, stem or leaf, give rise to new plants. No reproductive organs take part in this method of reproduction and therefore, no

seeds are produced.

Vegetative Propagation by Roots- In sweet potato, dahlia or asparagus, the swollen roots are present. New plants arise from these swollen roots buried in the soil **(Fig. 12.5).**

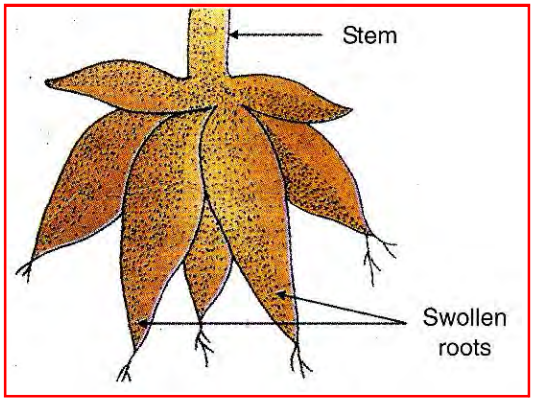

Fig. 12.5 : Roots of Dahlia

Activity 12.1

Take about 10 gram of yeast powder and put it in a glass beaker containing warm water in which a spoonful of sugar has been dissolved. Keep the beaker in a warm place (at about 35^0 to 40^0C). After an hour, take a drop of solution from the beaker on a glass slide, and observe the slide under the microscope. Make a sketch of what you observe. You will observe budding in yeast. Yeast powder can be obtained from a bakery or a chemist shop.

Activity 12.2

To grow your own fungi like bread mould take a small piece of bread, a paper napkin, a small jar or bottle with cap and water.

Now perform the activity as follows:

a) Cut a piece of napkin to fit in the bottom of the jar.

b) Pour a small amount of water into the jar-just enough to wet the paper napkin completely.

c) Place a piece of bread on the moist paper napkin.

d) Cap the jar loosely. This is very important.

e) Place the jar in a dark place where it is not cold.

f) Look at it everyday for a week and draw pictures showing how the mould looked during its growth stages.

Activity 12.3

Take swollen roots of sweet potato or asparagus. Place some of these roots in a flower pot containing moist soil. Observe after a few days.

What do you observe ?

New plants will grow from the roots buried in the soil.

Vegetative Propagation by Stems- A number of plants like potato, ginger, sugarcane and gladiolus multiply by stems.

Potato plants produce flowers, fruits and seeds. Yet, they never grow into plants.

The potato which you eat is in fact an underground swollen stem (tuber) which contains stored food material. If you observe a potato with a magnifying glass, you will find 'scars'. These scars are called 'eyes'. The 'eyes' on the potato tuber sprout (germinate) and give rise to new plants **(Fig.12.6).**

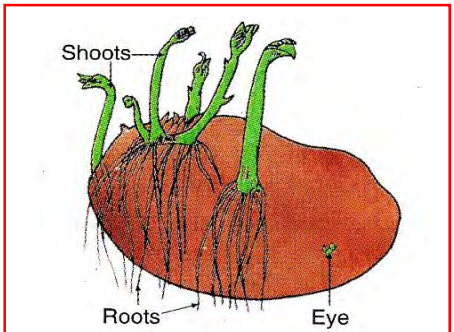

Fig. 12.6 : A sprouted potato tuber showing the development of many plants.

Activity 12.4

Take a potato tuber and observe it with a hand lens. You will be able to see 'eyes' on it. Now, cut a piece of it and plant the cut piece in a pot containing soil. Observe the new plant (roots, stem and levels) developing from the cut potato piece.

Likewise, ginger is a modified swollen underground stem **(rhizome)** with stored food. Under favorable conditions, the buds on the stem give rise to new plants.

In strawberry, long stems grow over the soil surface and are called **runners (Fig. 12.7).** Buds which are present on the stem grow into new plants.

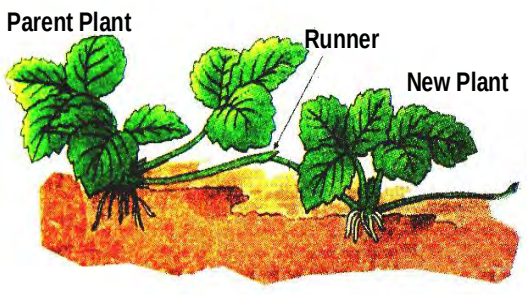

Fig. 12.7 : Runner in strawberry

Vegetative Propagation by Leaves

Some plants like *Bryophyllum* (sprout leaf plant), Begonia can be propagated by leaves. In *Bryophyllum,* plantlets develop from the margins of intact leaves. These plantlets, on being detached, develop into independent plants **(Fig. 12.8).**

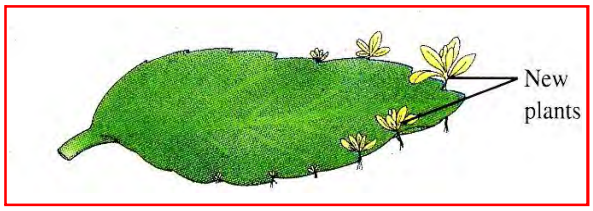

Fig. 12.8 : Buds present in individual notches along the margin of a Bryophyllum leaf are capable of forming new plants.

Advantages of Vegetative Reproduction

1. It is an easier, rapid and less expensive method of propagation. Plants can be grown in much less time.
2. Seedless plants can be raised.
3. Plants produced by this method are identical copies of the parent plants and show no variations.
4. Plants like banana, sugarcane, sweet potato, rose and jasmine do not produce viable seeds. Such plants can be easily grown by this method.

Activity 12.5

Take a Bryophyllum leaf and place it on the moist soil in a dish or a flower pot. Take care that margins of the leaf remain in touch with the moist soil.

Observe after 2-3 days.

Some small plants with fine roots and shoots will come out from the notches of the leaf.

Now, separate a small plant from the leaf notch and plant it in soil in another pot.

Observe what happens.

In a few days, you will find that a mature plant develops.

Artificial methods of Vegetative Propagation

Because of the advantages offered by vegetative propagation, humans have used this method for artificial multiplication of useful plants. For this reason, such multiplication methods are called artificial methods of vegetative propagation. Some of these methods are as follows:

1. **Cutting,** as in rose and sugarcane.
2. **Layering,** as in jasmine (Chameli) plant.
3. **Grafting,** as in case of mango.

4. Tissue culture

1. Cutting: (a) Stem Cuttings: Cuttings are short lengths of the plant which, when removed and placed in soil, with suitable conditions develop roots and leaves and grow into independent plants. **(Fig 12.9)**

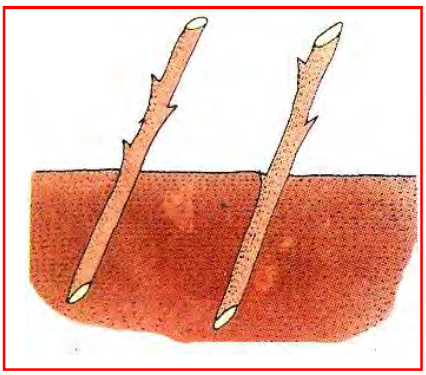

Fig. 12.9 :Cutting in rose

Sometimes the stem cutting has to be dipped into a rooting hormone to stimulate rooting. Rose, coleus, bougainvillea, sugarcane and cactus are easily propagated by cuttings.

(b) Root cuttings: In certain plants like lemon, tamarind, etc., root cuttings when put in the damp soil give rise to roots and shoots and form new plants.

2. Layering (Fig. 12.10): The lower branch of the stem is bent so that a part of the stem is buried under the soil. The growing tip remains above the soil surface. After sometime, roots grow from the stem part buried in the soil. Now this new plant can be cut from the parent plant and planted as a new independent plant. This method is used in plants like jasmine, strawberry and bougainvillea.

Fig. 12.10 : Layering in Jasmine

3. Grafting (Fig. 12.11): In grafting, the desired plant is derived from two different individuals. The root portion taken from one plant is called the stock while the stem portion from the other is called the scion. Scion is the plant which one wants to propagate and so it is grafted on to the stock. The grafting ends of the stock and scion are obliquely cut and placed face to face. Then the two ends are tied tightly.

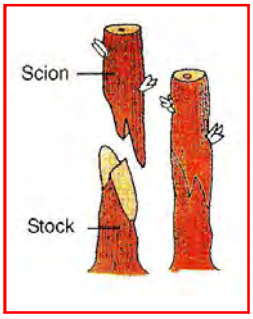

Fig. 12.11 :Grafting

4. Tissue culture: In this method, a tissue is taken from the tip of a plant as it is composed of undifferentiated and immature rapidly dividing cells. The tissue is grown in a suitable medium containing necessary nutrients and

hormones. The tissue grows into an unorganized mass called callus. Small parts of this callus are put in another medium which induces the formation of plantlets. The plantlets can be transplanted in the soil or in pots. This technique is also called **micro propagation (Fig 12.12).**

Since in a very short time, unlimited number of plants can be produced, this technique is being used for the propagation of disease-free orchids, carnation, gladiolus, chrysanthemum, potato, sugarcane and other plants.

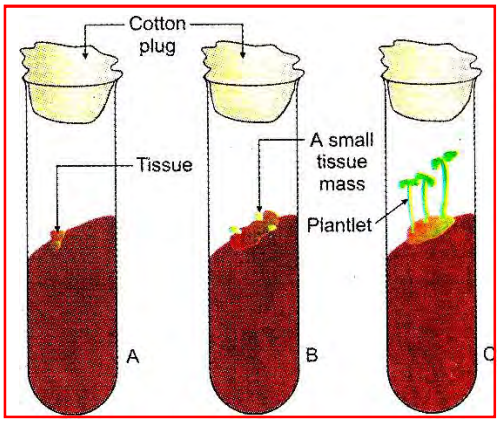

Fig. 12.12 :Tissue Culture

Activity 12 .6

Visit a nearby nursery and note down the names of ten plants growing there. With the help of a gardener (mali), find out the method of multiplication followed in the case of these plants.

12.4 SEXUAL REPRODUCTION

In nature, sexual reproduction occurs in plants as well as animals. **It is the most common method of reproduction.**

As stated earlier, two parents, one male, and the other female, are required for sexual reproduction. Two types of reproductive cells, called **gametes** are produced from the reproductive organs of two parents. Male parent produces the **male gamete** and the female parent produces the **female gamete.**

A male gamete is usually small with a nucleus and little cytoplasm. The female gamete is larger, with a nucleus and more cytoplasm than the male.

The fusion of the two gametes is called **fertilization.** The product of fusion of the two gametes is called the **zygote.**

The male gamete in a flowering plant is a nucleus in the pollen grain; in most animals, it is the sperm. The female

gamete in plants is a large egg cell in the ovule; while in animals, it is the ovum.
After fertilization, the zygote undergoes cell division and growth. Ultimately, forms the new individual.

Thought for you : Imagine, there was no sexual reproduction in man, and man could reproduce asexually. What would be the consequences of such a reproductive process in man, and other organisms ?

Why do we need sexual reproduction?

Sexual reproduction brings about a fusion of gametes from both the parents. The zygote so formed thus possesses characters of both parents. This also helps to bring variations among new individuals. You can now understand why children of the same parents show variations. Do you find such variations in organisms reproducing asexually?

12.5 SEXUAL REPRODUCTION IN PLANTS

In the last class, you have learnt about the structure of a flower. To recall, a flower has commonly four parts. These parts, in order from the outside are sepals, petals, stamens and pistil **(Fig. 12.13).** Of these four parts, stamens and carpels are the important parts, as these take part in sexual reproduction. The **stamens** are the male reproduction part, while the **pistil** (or carpel) is the female part.

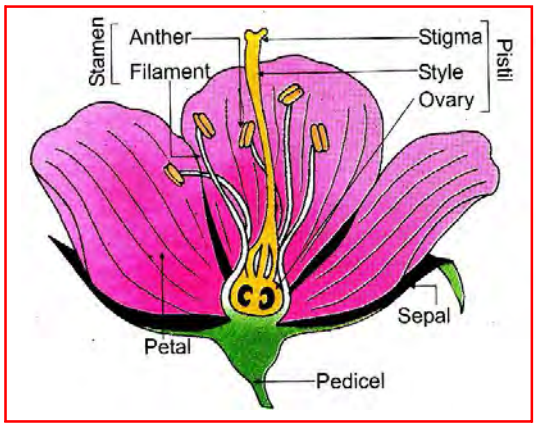

Fig. 12.13 : Parts of a flower

A **stamen** consists of an **anther** and a **filament (Fig. 12.14).** An anther is a swollen structure present on the tip of the filament. The anther produces a powdery substance called the **pollen grains.**

Fig. 12.14: A stamen

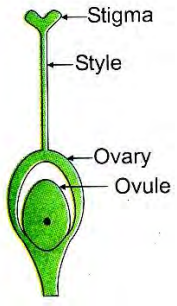

Fig. 12.15: A pistil

Pollen grains contain the male sex cell or male gamete. Pollen grains are light and can be carried by wind, water or insects.

A **pistil** consists of a basal swollen portion called the **ovary.** The ovary continues into a long **style** and ends in a knob-like part, the **stigma (Fig 12.15).** The ovary contains many **ovules.** The female sex cell or gamete (egg) is present inside the ovule **(Fig. 12.16).**

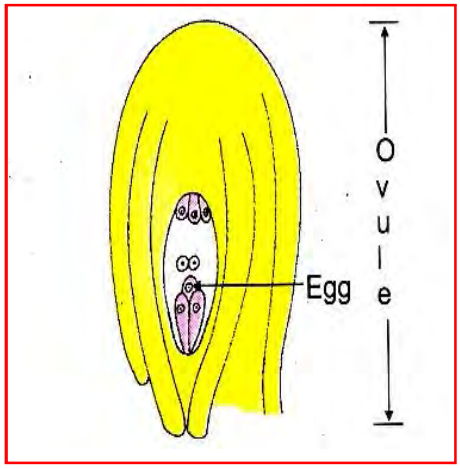

Fig. 12.16: Female gamete inside the ovule

In many plants, the male and female parts are present in the same flower. Such flowers are called **bisexual.** Examples pea, rose, mustard, sunflower and china-rose.

In some, the male and the female parts are borne in different flowers. Such flowers are called **unisexual.** Examples-date palm, papaya, mulberry, corn and cucumber.

Pollination

Pollination is the transfer of pollen grains from the ripe anther to the stigma. The transfer of pollen grains to the stigma can take place in two ways:

1. Within the same flower or between flowers of the same plant called **Self Pollination.**
2. Between flowers from different plants of the same species called **Cross Pollination (Fig 12.17).**

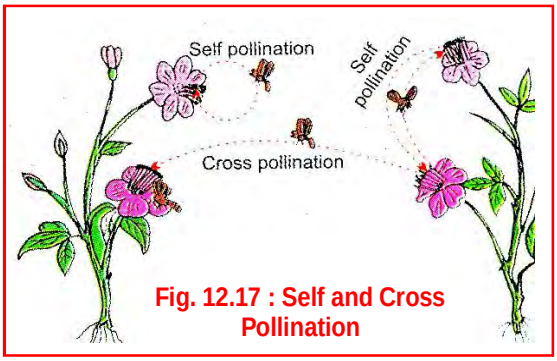

Fig. 12.17 : Self and Cross Pollination

Cross pollination often involves various external agencies to carry pollen grains from one flower to another one. These agencies may be air, water, insects or animals. Most flowers are pollinated by insects.

When you visit a garden during flowering season, you observe many butterflies, bees and moths. What are the insects doing? Though these insects visit the flower for nectar or honey, at the same time, they help in pollination **(Fig 12.18).**

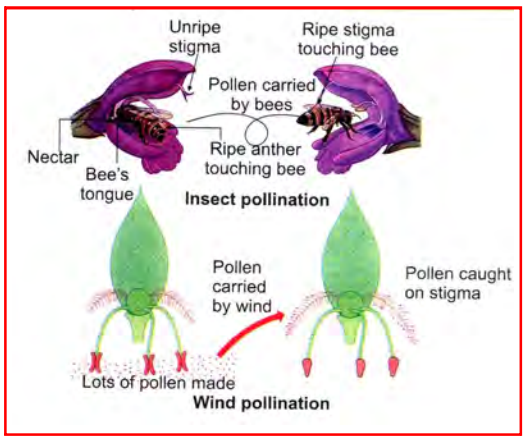

Fig. 12.18 : Insect and wind-pollination

Perform the **Activity 12.7** to see what the insects do when they visit a flower.

When an insect visits a flower, the pollen grains get deposited on the body of the insects. When this insect visits another flower, the deposited pollen grains now get dusted on the stigma of the second flower, thus bringing about the transfer of pollen grains from the anther to the stigma **(pollination).**

Activity 12.7

Catch an insect immediately after it has visited a flower. Dust its body on a white paper with a fine brush. With the help of a hand lens, observe the paper.

Do you find something on the paper?

Yes, you find that there are small rounded structures. These are the **pollen grains,** which were deposited on the insect's body when it visited the flower to collect nectar or honey.

Activity 12.8

Observe the flowers and the method of pollination in sunflower, china-rose, salvia and maize. Make these observations in nature. Note down in your notebook what you observe. Use a hand lens while observing the pollen grains.

You will make the following observations:

(1) The flowers in case of sunflowers, china-rose and salvia are large, coloured and showy. But in case of maize, flowers are small and not coloured.

(2) Flowers in case of sunflower, china-rose and salvia have either scent or nectar. But in case of maize, flowers have no scent or nectar.

(3) Pollen grains in the first three flowers are sticky and bigger in size, so that these can stick on the insect's body. In case of maize, pollen grains are very small in size and dry. Such pollen grains can be easily carried by wind.

The wind-blown pollen grains are caught by stigmas which hang out.

What do you conclude from your observations?

(1) Flowers in case of sunflower, china-rose and salvia **(Fig. 12.18)** are insect- pollinated.
(2) Flowers in case of maize are wind-pollinated.

Fertilization

Fertilization is a step between pollination and seed formation.

The fusion of the male gamete with the female gamete is called **fertilization.** During fertilization, the following events take place:

(1) The pollen grains germinate on the stigma, and pollen tubes develop. The pollen tubes move downwards into the style **(Fig. 12.20)**. The pollen tubes are carriers of male gametes **(Fig. 12.19.).**

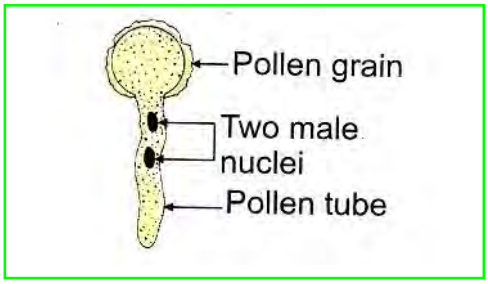

Fig. 12.19 : Pollen grain develops into a tube carrying male gametes.

(2) One pollen tube finally enters the ovule, where female gamete is located **(Fig.12.20).**

Female gamete or egg cell is present inside the ovule.

(3) Finally the male gamete fuses with the female gamete. This completes the process of fertilization. The fusion product or the cell formed as a result of fusion of the two gametes is called Zygote. The zygote soon develops into an **embryo (body plant).**

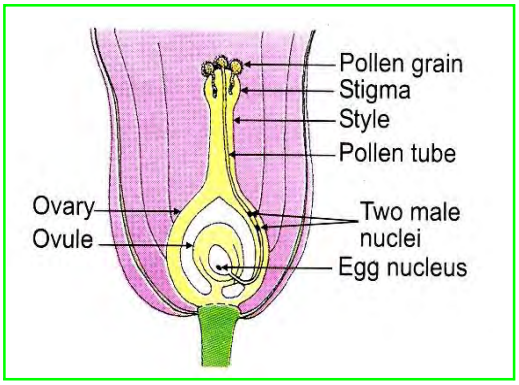

Fig. 12.20 : Process of fertilization

Formation of Fruit and Seed

What happens to the flower after fertilization? If you observe carefully, you may see following changes in a flower:

(1) The flower loses its bright colour.
(2) The sepals, petals, and stamens fall off.
(3) The ovary increases in size and becomes the fruit. The fruit thus is

the ripened ovary.

(4) The ovary wall becomes the fruit wall.

(5) Inside the ovary, the ovules develop to form the **seeds.**

The Fruit : Let us perform the following **Activity 12.11.**

Fruits of the type of pea are called **dry fruits.** The fruit wall in such a fruit is thin and dry.

Activity 12.9

Take a cavity slide (a cavity slide is a microscopic slide with a small cavity in it). Put a few drops of 3% sugar solution in the cavity. With the help of a fine brush, collect some pollen grains from a mature anther and dust these on the sugar solution. Place a cover slip on the cavity of the slide.

Leave the slide undisturbed for some time and then observe under the microscope. What do you observe?

You will find small tubes coming out from the pollen grains **(Fig. 12.19).**

Activity 12.10

Examine the stigmas of a number of flowers found in your garden, under the low power of a microscope. Pollen grains may be seen adhering to them. Now place a drop of water and crush the stigmas between two slides. You may see pollen tubes.

Activity 12.11

Examine a pea fruit and a mango fruit. Remove the outer covering in both these fruits. What do you observe?

In case of pea fruit, once the outer green covering is removed, the rounded seeds become visible **(Fig. 12.21).** The fruit wall in pea is thin and dry.

In a mango fruit, after the removal of the outer covering, you find the freshly portion which you eat. Inside the freshly portion, a stony part of the fruit wall is present. Seed is present inside

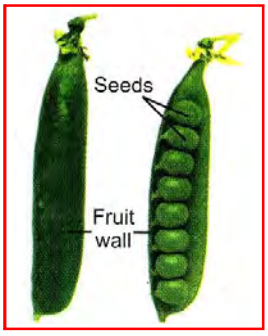

Fig. 12.21 : Fruit of pea

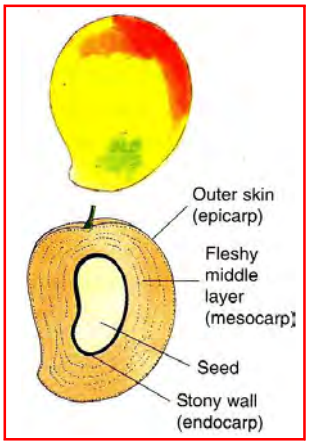

Fig. 12.22 : Fruit of mango

the stony wall **(Fig. 12. 22).** The fruit wall in mango has, therefore three layers:-

(i) Outer skin **(epicarp).**

(ii) Middle fleshy portion **(mesocarp),** and

(iii) Inner stony wall **(endocarp).**

Activity 12.12

Collect the fruits of bean, lady finger, sun flower, maize, tomato, brinjal, orange, coconut and plum. Study these fruits and classify them as dry and fleshy fruits giving reasons.

Examples of dry fruit : Cotton, lady finger, maize, sunflower, bean.

On the other hand, mango fruit is a **fleshy fruit,** as the fruit wall is thick and fleshy.

Examples of fleshy fruit : Tomato, brinjal, orange, coconut, plum.

Functions of fruits

(I) The fruit wall gives **protection to the seeds** and therefore, to the embryo.

(Ii) The fruit is a **store house of food** material.

(Iii) The fruit helps in the dispersal of seeds.

Seed

A seed contains an **embryo,** one or two **cotyledons** and a protective **seed coat (Fig 12.23).** The embryo, after germination of the seed, develops into a new plant. The cotyledons often contain reserve food material for the developing plant.

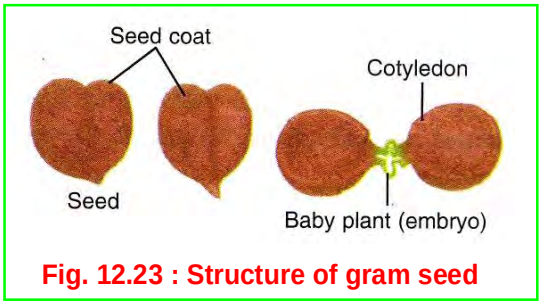

Fig. 12.23 : Structure of gram seed

12.6 DISPERSAL OF SEEDS AND FRUITS

For a seed to give rise to a new plant, certain favourable conditions are necessary. A seed must fall on a suitable place where favourable conditions are present. How are seeds carried or dispersed to such a place?

Can you imagine what would happen if the seeds were to germinate near the plant itself and not get dispersed to distant

places?

Let us study the following seeds or fruits to know about the mechanism of dispersal.

Collect seeds/ fruits of drumstick, maple, calotropis (madar), gokhru (tribulus), okra (xanthium) and coconut, with the help of your class teacher.

Examine these seeds or fruits. What do you find?

You will find different situations:-

(I) In some cases like madar **(Fig 12. 24)**, the seeds are small and dry. A fine tuft of fine hair is present on the tip of each seed. These seeds are carried to far- off places by wind.

(ii) In maple, the fruit has flat, wing-like light structure **(Fig 12.25).** Like madar, these fruits are dispersed by wind.

(iii) In gokhru and xanthium, the fruits are thorny **(Fig 12.26)** and stick to our clothes as we pass by them. These fruits also stick to bodies of passing animals. The animals as well human beings help in dispersal.

(iv) In case of coconut which is grown on the sea shore, the fruit is large and fibrous **(Fig 12.27).** It falls in water, and being fibrous it floats in water, it is thus carried away from the parent plant by water currents.

Fig. 12.24 : Seed of madar

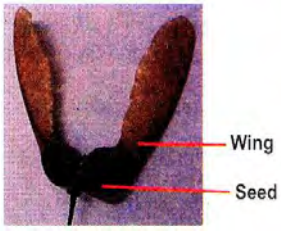

Fig. 12.25 : Fruit of maple

(A) (B)

Fig. 12.26 :A. Fruit of gokhru B. Fruit of Xanthium

Fig. 12.27 : Fibrous fruit of coconut dispersed by water

Thus, seeds and fruits may be dispersed to places away from the parent plant by various means like wind, animals, or water.

Seed dispersal helps the plants to (i) prevent overcrowding, (ii) avoid competition for water, mineral and sunlight, and (iii) spread to new habitats.

KEYWORDS

Asexual reproduction	Binary fission	Bisexual
Budding	Cutting	Embryo
Fertilization	Gametes	Grafting
Layering	Pollination	Regeneration
Tissue culture	Unisexual	Vegetative propagation

What you have learnt

- Reproduction is the process in which living organisms produce new individuals of their own kind. It is the means of perpetuation of species.
- Broadly, there are two modes of reproduction - Asexual and sexual.
- Asexual reproduction involves only one parent. Sex organ or gametes are not involved.
- Different types of asexual reproduction are fission, budding, fragmentation, spore formation, regeneration and vegetative reproduction.
- Sexual reproduction involves two parents. Two types of gamete are formed. The male parent produces the male gamete (sperm) and the female parent produces the female gamete (ovum).
- In higher plants, flowers are the reproductive organs. Stamens are the male reproductive organs producing male gamete, while pistil is the female reproductive part producing the female gamete or egg inside the ovule.
- Pollination (transfer of pollen grains from the anthers to the stigma) and fertilization (fusion of male gamete with the female gamete) results in fruit and seed.
- Fertilized egg is called zygote.
- Sexual reproduction brings about variations among new individuals. No variation is caused by asexual reproduction.
- Seed dispersal takes place by wind, water and animals.

EXERCISES

(I) Multiple choice questions - Tick mark (✓) the correct choice.

1. The common method of reproduction in bacteria is

(a) budding (b) fragmentation

(c) binary fission (d) all the above

2. Budding is commonly seen in

(a) Yeast (b) Grasses

(c) Amoeba (d) Bryophyllum

3. Reproduction or propagation by stem is common in

(a) Rose (b) Potato

(c) Sweet potato (d) Bryophyllum

4. Unisexual flowers are found in

(a) Mulberry (b) Mustard

(c) Pea (d) Sunflower

5. A seed consists of

(a) Embryo (b) Seed coat and cotyledons

(c) Embryo and seed coat (d) Seed coat and endosperm

6. An embryo of a seed consists of

(a) Plumule (b) Radicle, plumule and cotyledons

(c) Plumule and radicle (d) Radicle and cotyledons

(II) Fill in the blanks:

(a) Budding is a kind of _____ reproduction.

(b) The amount of cytoplasm in the parent cell is _____ than the amount in the bud.

(c) Yeast cells reproduce by _____.

(d) Binary fission produces cells of _____ size.

(e) Budding produces cells of _____size.

(f) Fungi, ferns and mosses reproduce by_____.

(g) Male sex cells in plants are called _____.

(h) The two kinds of pollination are _____ and _____.

(III) State whether the statement given below are true or false:-

Statements **False/True**

(a) Asexual reproduction is more common than the sexual reproduction.

(b) Producing life is called respiration.

(c) Bacteria and yeast reproduce by asexual reproduction.

(d) Reproduction by spores is a method of asexual reproduction.

(e) A potato tuber is really an underground stem.

(f) A whole new plant can grow from the eye of a tuber.

(g) Cutting and grafting are natural means of reproduction.

(h) Most organisms have the capacity of regeneration in some or the other ways.

(i) Stamens make eggs cells.

(j) A fertilized egg becomes a seed.

(k) Flowers which possess stamens and pistils are called unisexual.

(l) Insect pollinated flowers are brightly coloured.

(IV) Differentiate between the following:

1. Asexual reproduction and sexual reproduction.

2. Binary fission and budding.

3. Self pollination and cross pollination

4. Insect pollination flowers and wind pollination flowers

5. Zygote and embryo

(V). Find the odd one out, giving reasons:

1. Gamete, budding, fragmentation, regeneration.
2. Cutting, grafting, layering, binary fission.
3. Ovary, stigma, style, pollen grain.

(VI) Name the following:

1. Part of the flower where ovule is found.
2. Three agents of pollination.
3. The place where fertilization occurs in the flowering plant.

(VII) Mention the functions of the following:

1. Flower 2. Anther
3. Ovary 4. Stigma
5. Seed dispersal

(VIII) Answer the following Questions:

1. Why is reproduction necessary for living organisms?

2. How much of the parent's nuclear material does each daughter cell get during reproduction by binary fission?

3. What kind of reproduction is binary fission?

4. How many parents take part in binary fission?

5. Describe the various methods of asexual reproduction?

6. Describe the various methods of vegetative reproduction?

7. Mention two characteristic features of wind Pollinated flowers.

8. Mention two features of insect-pollinated flowers.

9. Describe the various steps leading to the formation of seeds in plants.

10. Describe the various ways by which seeds are dispersed.

(IX) Spell the missing word

Fill in the missing letters to spell the terms that fit the definition

1.	___t___g___a	(a) Top part of pistil
2.	___g____	(b) Female gamete
3.	___m___r___ o	(c) Baby plant
4.	___u___d___n___	(d) Method of asexual reproduction

(X) Spot the odd term

In each of the following set one terms does not belong to the set. Circle that term.

1.	Sexual reproduction	asexual reproduction	one parent
2.	Sexual reproduction	asexual reproduction	two parents
3.	Binary fission	bacteria	yeast
4.	Binary fission	budding	yeast
5.	Stamen	anther	style

For more information, read on the following websites:

www.edumedia-science. com/a437_P2-blog-call.html

http:///koning.ecsu.ctstate4.edu/plants_Human/flowerstructure.html.