St. Andrews Scots Sr. Sec. School

9th Avenue, I.P. Extension, Patparganj, Delhi – 110092.
Session : 2022-2023
Subject : Science
Class : VII **L-10: Reproduction in Plants** **Topic: Notes**

All the living organisms including plants and animals have the capability to produce new individuals during their lifespan. This process of producing a new organism from the existing organism (or the parent) of the same species is called reproduction. The new individuals produced, are the copies of their parents. The process of reproduction is one of the important life processes and is essential for the continuity of the species.

Thus, reproduction makes the life continuous which is not only essential for the survival of an organism but it is also very necessary for the perpetuation and preservation of the species because it increases the number of members of a species.

DIFFERENT MODES OF REPRODUCTION

The various parts of a plant such as roots, stem and leaves each with a specific function is called vegetative parts. After a certain period of growth, plants bear flowers. These flowers develop into fruits and seeds.

The parts of a plant that participate in the process of sexual reproduction are called reproductive parts or organs. In plants, the reproductive parts are a flower which may have the male or female part or both the parts on the same flower.

Different organisms reproduce in a different way. In plants, there are two different methods of reproduction:

1. Asexual reproduction

2. Sexual reproduction

The term ‘sexual’ means involving the fusion of sex cells or gametes while ‘asexual’ means without involving the fusion of gametes.

ASEXUAL REPRODUCTION

The process in which only one parent is involved in the production of new individuals of the same kind is called asexual reproduction. In plants, asexual reproduction results in the formation of offsprings or new plants without seeds spores.

Asexual reproduction in plants occurs through the following methods:

1. Budding

2. Fission – Binary and Multiple

3. Fragmentation

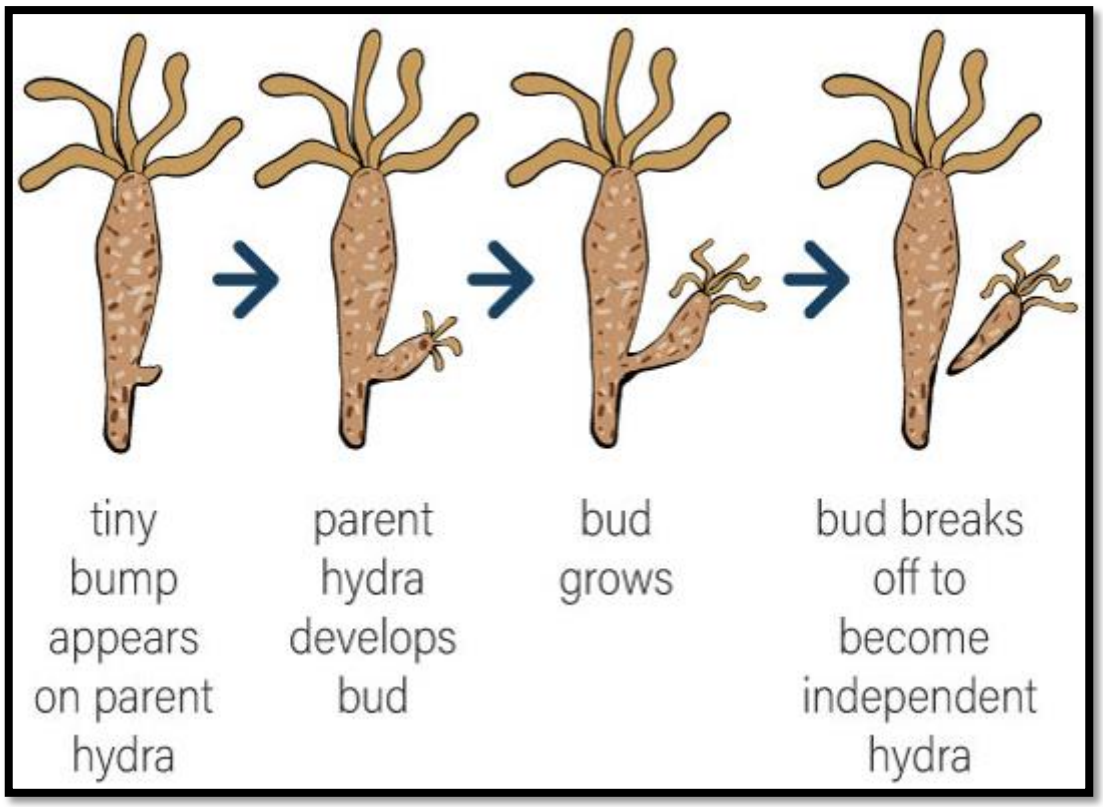
4. Spore Formation

Budding:-

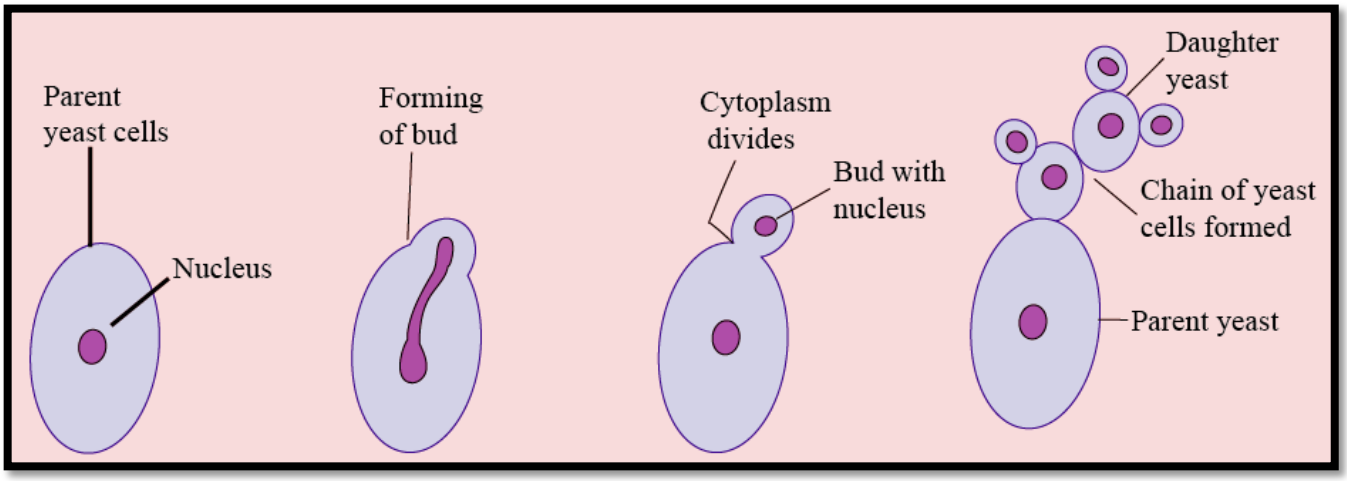
Budding is an asexual mode of producing new organisms. In this process, a new organism is developed from a small part of the parent’s body. A bud which is formed detaches to develop into a new organism.

The newly developed organism remains attached as it grows further. It is separated from the parent organism when it gets matured by leaving scar tissues behind. As this is asexual reproduction, the newly developed organism is a replica of the parent and is genetically identical.

For reproduction, Hydra uses regenerative cells where a bud expands as an outgrowth because of repeated cell division at one specific location. These buds then developed into new small individuals which when completely matured, detach from the parent body.



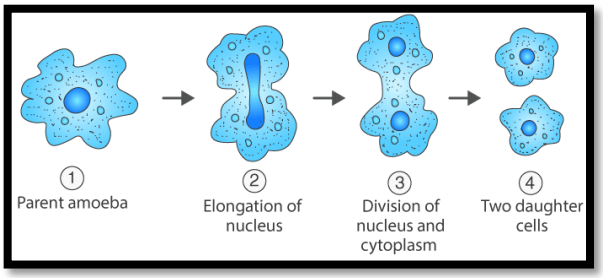
BUDDING IN HYDRA



BUDDING IN YEAST

Binary Fission:-

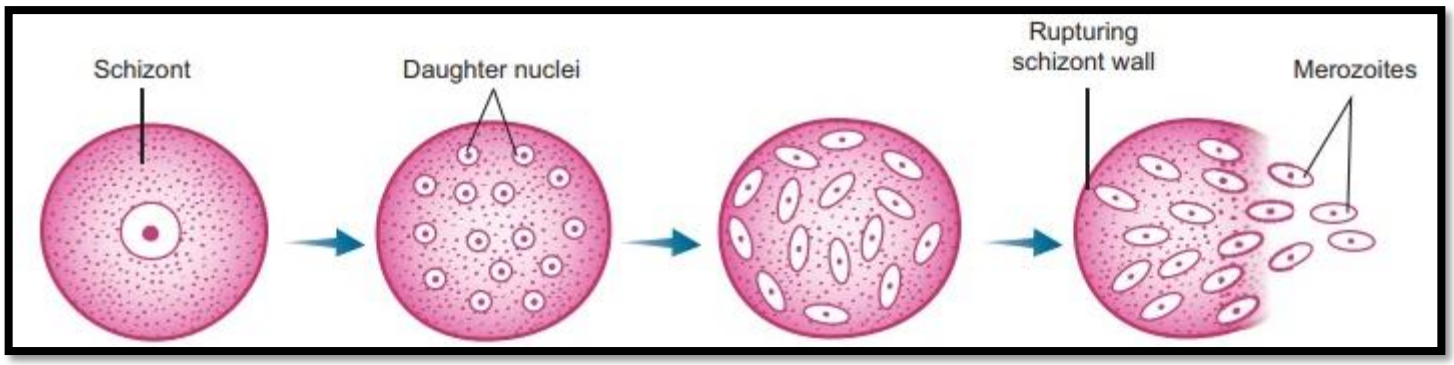
Binary fission is a form of asexual reproduction in which an organism divides into two, each part carrying one copy of genetic material."



BINARY FISSION IN AMOEBA

Multiple Fission:-

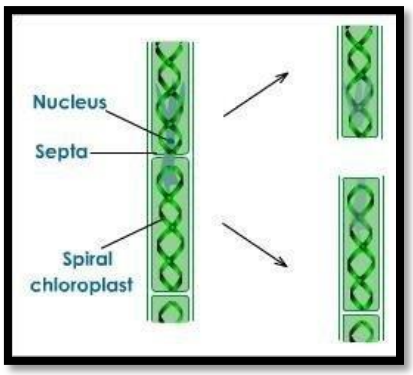
Multiple fission is the process of asexual reproduction in which instead of 2 daughter cells, many daughter cells are produced from the parent cell. In this, the nucleus undergoes repeated division to produce a large number of nuclei. Each nucleus along with little bit of cytoplasm forms a membrane around it. All the daughter cells are equal sized and are similar. Plasmodium, true slime molds (Myxomycetes) exhibit this type of asexual reproduction.



MULTIPLE FISSION IN PLASMODIUM

Fragmentation:-

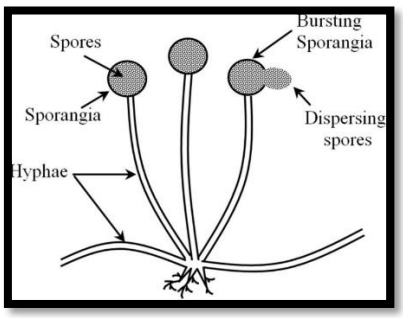
Some algae (Spirogyra) that are present in waterbodies reproduce by fragmentation. In this- method, the body of the parent breaks into small pieces called fragments and each fragment grows up to become a new plant. Fragmentation of parent body occurs when they are matured.



FRAGMENTATION IN SPIROGYRA

Spore Formation:-

Some fungus like bread mould reproduces asexually by spore formation. Spores (present in the air) are the small spherical bodies, having a thick protective wall that protects them from unfavourable conditions. When favourable conditions arrive the spores burst and germinate to develop into new plants. pores are very light asexually reproducing bodies which can be carried over a long distance by air or wind. Some other plants like mosses and ferns also reproduce by spore formation in the underside of their leaves.



SPORE FORMATION IN RHIZOPUS

VEGETATIVE REPRODUCTION OR PROPAGATION

It is a type of asexual reproduction in which new plants are produced from roots, stems, leaves and buds. Since reproduction is through the vegetative parts of the plant, it is known as **vegetative propagation**.

1. **Natural Vegetative Propagation**

a) By Roots:-

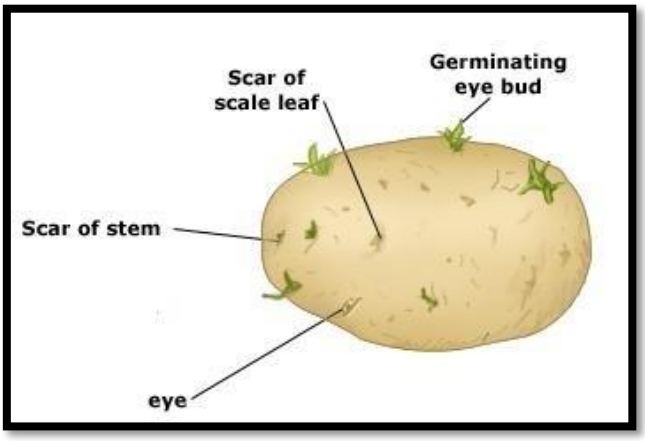
In this process, new plants grow out of the modified roots called tubers. In fact, in some plant species, roots develop adventitious buds. These buds grow and form new plants/sprouts under the right conditions. For example, Sweet potato and Dahlia. These sprouts can be separated from the parent plant and when planted in other areas, new plants are formed.

SWEET POTATO

b) By Stems:-

Stems are the most common part of vegetative reproduction. Many plants propagate and form new plants through their stems. Following are the different types of vegetative reproduction by stems:

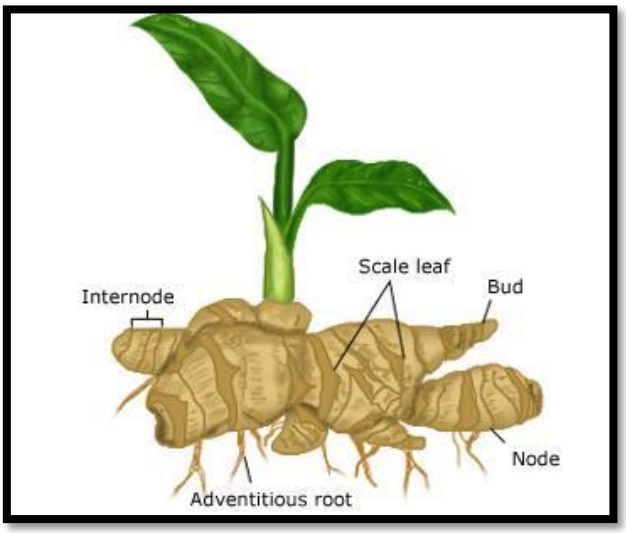
i) Tuber – A swollen stem that stores food is known as **tuber.** A tuber has some depressions called eyes. Each eye has one or more buds from which new plants arise. Potato reproduces by forming tubers. If a potato is planted in soil, the roots arise from its 'eyes' and new plants grow.



TUBER-POTATO

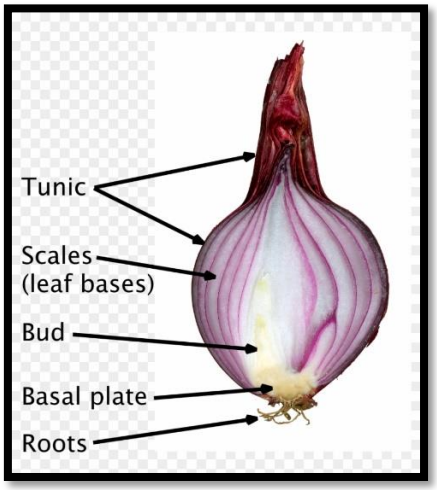
ii) Rhizome – **Rhizome**, also called **creeping rootstalk**, horizontal underground plant stem capable of producing the shoot and root systems of a new plant. Rhizomes are used to store starches and proteins and enable plants to perennate (survive an annual unfavourable season) underground. In addition, those modified stems allow the parent plant to propagate vegetatively (asexually), and some plants, such as poplars and various bamboos, rely heavily on rhizomes for that purpose. In plants such as water lilies and many ferns, the rhizome is the only stem

of the plant. In such cases, only the leaves and flowers are readily visible. Notably, the rhizomes of some species—including ginger, turmeric, and lotus—are edible and valued for their culinary applications.



RHIZOME-GINGER

iii) Bulbs – Bulbs are also underground stems encased in thick fleshy bulb scales. These scales are modified leaves and store food. The new plant arising from the bulb takes food from the fleshy scales. Bulbs are found in onion plants, shallot, garlic.



ONION BULB

iv) Runner – Some plants grow horizontal stems parallel to the ground. They are called runners. These stems contain nodes from which new plants grow. Oxalis and grass propagate by this method.

v) Sucker – In mint and Chrysanthemum, underground stems are divided into nodes and internodes. New shoots develop from the nodes. When the internodal regions decay, each shoot separates and forms a new plant. These plants are called suckers.

vi) Corm – Corm is an underground stem with scale leaves and buds. In favourable conditions, the buds give rise to new plants. Colocasia and Gladiolus reproduce by this method.

c) By Leaves:-

Begonia and Bryophyllum are examples of vegetative propagation by leaves. This is a form of asexual reproduction in which new plants grow from the buds growing on the margin of the leaves. These buds are reproductive in nature and when they fall on the ground they germinate and form a new plant.

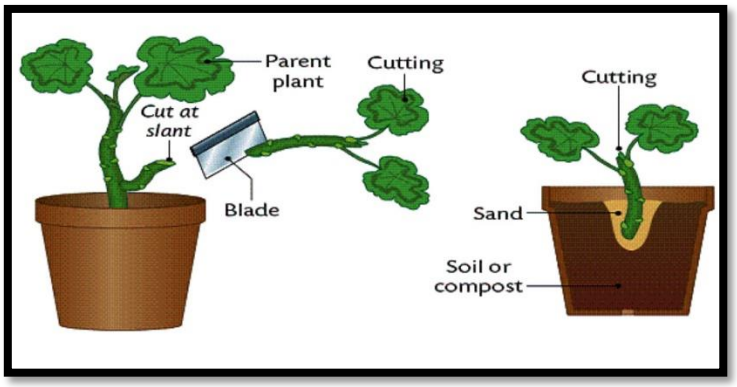
VEGETATIVE PROPAGATION BY LEAF

2. Artificial Vegetative Propagation

This is a type of vegetative reproduction carried out by humans in the fields and laboratories. The most common types of vegetative reproduction occurring artificially include:

Cutting

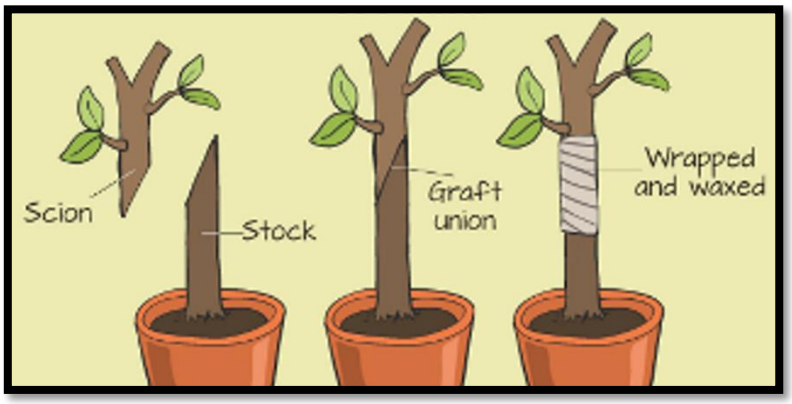
In this, a part of a plant, specifically a stem or leaf is cut and planted in the soil. These cuttings are sometimes treated with hormones to induce root development. The new plant is formed from the adventitious roots developing from the cutting.



CUTTING

Grafting

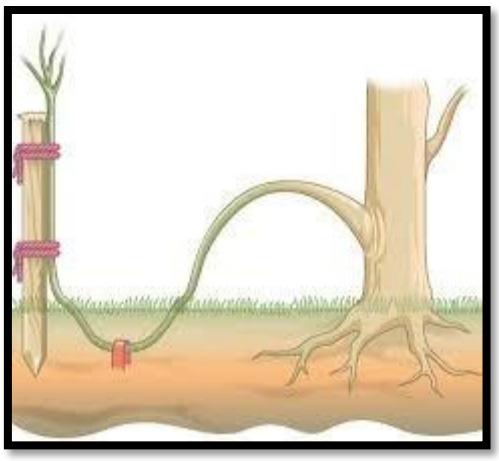
In this, the cutting from some other plant is attached to the stem of a plant rooted in the ground. The tissues of the graft become integrated with the tissues of the rooted plant and develop as a single plant over time.



GRAFTING

Layering

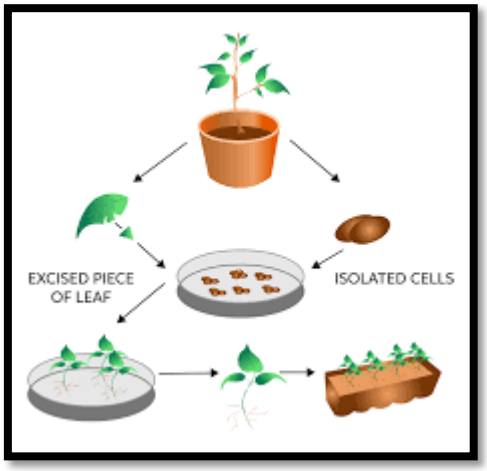
In this, the stem of the plant is bent to the ground and covered with soil. Adventitious roots emerge from the plant parts covered with the soil. This attached stem with developing roots is known as a layer.



LAYERING

Tissue Culture

In this, the plant cells from different parts of a plant are cultured in the laboratory to develop a new plant. This technique is helpful in increasing the number of rare and endangered plant species that are unable to grow under natural conditions.



TISSUE CULTURE

SEXUAL REPRODUCTION

In sexual reproduction, two parents are involved in producing a new individual. Offspring is produced by the fusion of gametes (sex cells) from each parent. Animals like dog, cats, lions, giraffe, humans, etc. all reproduce sexually.

Features of Sexual Reproduction

- Two parents are involved (both male and a female).
- Gamete formation and fertilization take place.
- The whole process is slow and lengthy.
- Variation occurs; offspring are different from parents, genetically and physically.

Sexual Reproduction in Plants

Reproduction in plants takes place sexually and asexually as well. But the majority of the flowering plants reproduce sexually. The flower is the reproductive part of a plant i.e., both male and female gametes are produced

by flowers. Sexual reproduction in plants takes place in flowers. The complete flower typically consists of four parts:

- Petals
- Sepals
- Stamen (male reproductive part)
- Pistil/Carpel (female reproductive part)

Stamen (male reproductive part) consists of anther and filament.

- The anther is a sac-like structure that produces and stores pollen.
- The filament supports the anther.

The pistil (female reproductive part) comprises three parts- stigma, style, and ovary.

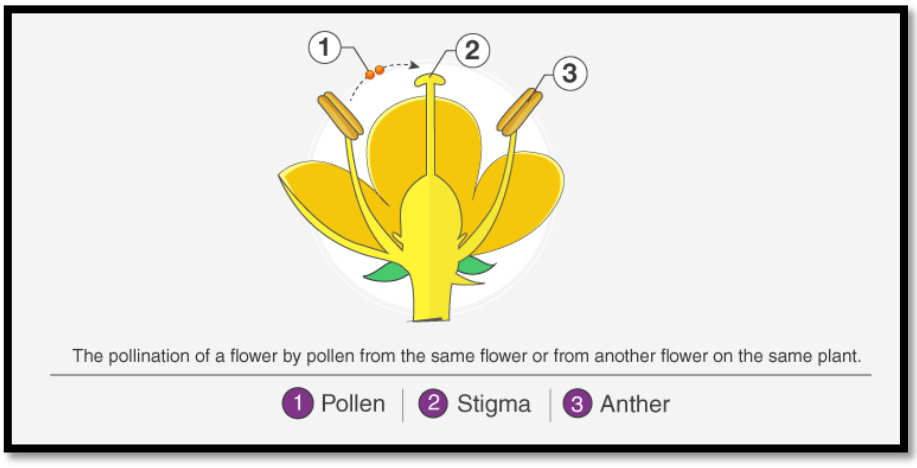
- Stigma is the topmost part of a flower.
- The style is the long tube which connects the stigma to the ovary.
- The ovary contains a lot of ovules. It is the part of the plant where the seed formation takes place.

A flower may consist of either stamen or pistil or both. Based on this, a flower can be either unisexual or bisexual. A bisexual flower is composed of all the four parts mentioned above, e.g. Rose, China rose. Whereas, plants like papaya and cucumber produce only unisexual flowers.

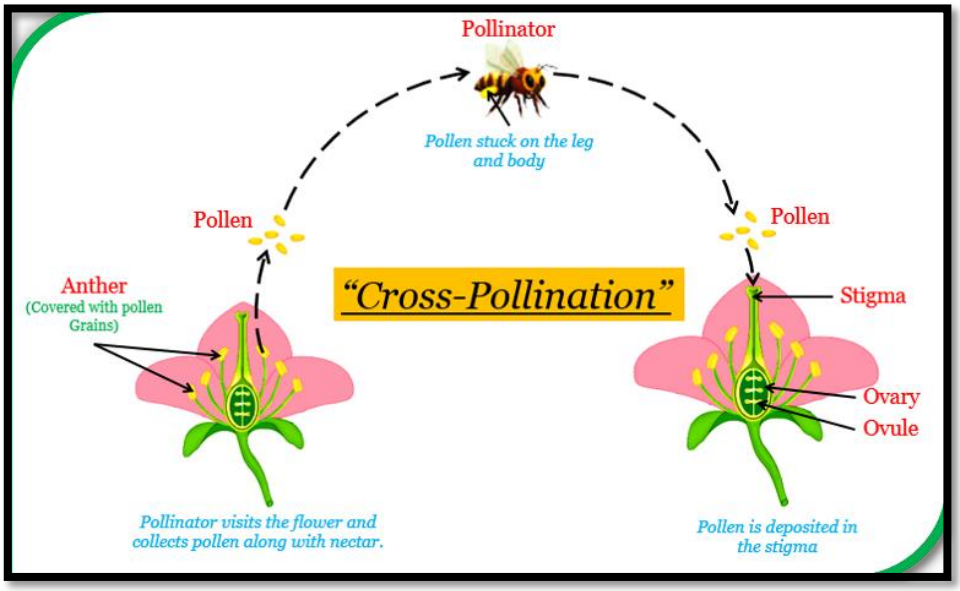
Pollination and Fertilization

In order to form a zygote, male gametes in pollen grains have to fuse with the egg in the ovule. This is achieved by a process called pollination. Pollination is the process of transferring pollen grains from the anther – male part of a flower, to the stigma – female part of a flower. Depending on the pollen landing, pollination can be classified into two types-

- **Self-Pollination:** A pollination where the pollen transfer takes place between the anther and stigma of the same flower.
- **Cross-Pollination:** A pollination where the pollen transfer takes place between the anther and the stigma of different flowers of the same plant or different plants of the same species.



SELF POLLINATION



Generally, pollination takes place with the help of certain agents so-called pollinators. They include insects, water, birds, wind, etc.

Once pollen gets transferred to the stigma the male gametes from pollen grains release and fuse with the egg in the ovule to form a zygote. This process of fusion of gametes is called fertilization. The zygote thus formed, divides and develops into an embryo, and later into a seed. The ovary develops into a fruit.

What is a Seed?

Seeds are the unit of the reproduction of a flowering plant that is capable to develop into a single plant. In some species of plant, like walnuts, groundnuts, and chickpeas, seeds are also used as sources of food.

A fully grown and developed seed has three primary parts: the embryo, endosperm, and seed coat. The plumule is present in the seed embryo, which develops into a new plant.

What is Seed Dispersal?

Seed Dispersal is an adaptive mechanism in all seed-bearing plants, participating in the movement or transport of seeds away from their parent plant to ensure the germination and survival of some of the seeds to adult plants. There are many vectors to transport the seed from one place to another.

Also, read: Formation and Dispersal of Seeds

Types of Seed Dispersal

There are different ways in which seeds from its parent plant is dispersed. These include:

a) Seed Dispersal by Wind

The wind is the natural and fundamental means of seed dispersal in the plant kingdom. This process of dispersal is mainly seen in those plants which bear very light seeds. The seeds of the orchid plant, dandelions, swan plants, cottonwood tree, hornbeam, ash, cattail, puya, willow herb, are all examples of plants whose seed are dispersed by the wind.

b) Seed Dispersal by Water

In this method of seed dispersal, seeds float away from their parent plant. These are mainly seen in those plant which lives in water or nearby the water bodies like beaches, lakes, ponds etc. Coconut, palm, mangroves, water lily, water mint, are a few examples of plants whose seed are dispersed by the water.

c) Seed Dispersal by Animal and Birds

There are different ways in which animals and birds disperse the seeds.

Few animals and birds are attracted to bright colourful fruits. They eat the entire fruit and only the juicy part is digested by their system and the seed are excreted out in the form of their dropping, which forms into new plants. Blackberry, cherry, tomato and apple seeds are dispersed in this way.

A few species of squirrels collect nuts from different plants like acorns and bury them under the soil as they store food for the winter season and often forget the place where they have previously buried them and the seeds grow into new trees.

There are a few plants which bear seeds with hooks. Burdock plant is an example of this type of plant species. The seed of these plants catches on the fur of animals and are carried away to different places, far from their parent plants.

Dates, rambutan, sea grapes, sea holly, tamarind, raspberry, sunflower, tomatoes are a few examples of plants whose seeds are dispersed by animals and birds.

d) Seed Dispersal by Gravity

Gravity is a force of attraction that exists among all the objects in the universe.

As the fruits from the tree fall on the ground due to the force of attraction, they sometimes roll down to some smaller distance, get buried in the soil after a few days and germinate into a new plant.

In certain cases, fruits which do not have very hard seed coat may crack and open after falling down from a height, which leads to a better dispersion of seeds.

In some cases, the fallen fruit is carried by other agents like water, wind, birds or animal and helps in the dispersion of seeds.

Apples, Commelina, canna, coconuts, calabash, passion fruit are a few examples of plants whose seeds are dispersed by Gravity – A force of attraction.

e) Seed Dispersal by Explosions

Explosions in fruits literally refer to bursting with all its energy. In this case, as the fruits get ripened, it shoots out its seeds into the external environment. This type of seed dispersal is mainly seen in those plants having pods. Okra, Lupins, gorse, and broom are a few examples of plants whose seeds are dispersed by Explosions. Pea and bean plants also have pods and the seeds burst out when they ripen and pod has dried.