

## Modes of Reproduction in Plants

Plants have two kinds of parts:

- **Vegetative Parts** - These are the parts of the plant that plays a major role in the life cycle of a plant such as preparation of food, transportation of food, water, and nutrients, etc. For Example, roots, stems, and leaves.
- **Reproductive Parts** - These are the parts of a plant that play a major role in the reproduction process in plants, For Example, flowers, fruits.

## Other parts

**Shoot** – A young plant is often termed as a shoot. Generally, a shoot is regarded as a part of the plant which has stems, leaves, and flowers.

**Node** – It is a part of the stem or branch of a plant from where the leaf arises.

**Vegetative Buds** – Sometimes buds are present in the leaves that are capable of developing into shoots. These are called **Vegetative Buds**.

Reproduction in plants can be categorized into two types:

- **Asexual Reproduction** – The new plants are produced without using the seeds. In this process, generally, the leaves, stems, and roots participate in reproduction.
- **Sexual Reproduction** – The new plants are produced with the help of the seeds of a plant. In this process, the flowers of the plants participate in reproduction.

## Types of asexual reproduction

1. **Vegetative Propagation**- When vegetative parts give rise to new plants, this type of reproduction is called as vegetative propagation.
  - If a branch of a plant is cut with a node and watered every day, roots and new leaves come out. Nodes are the parts of the stem or branch at which a leaf arises.
  - Flower buds and vegetative buds having short stems around which immature overlapping can give rise to a new plant. The buds which are present in the point of attachment of the leaf at the nodes are called vegetative buds.
  - Scars present in potatoes called as eyes can give rise to new organisms.



Fig. Eyes in potato

- Bryophyllum can give rise to new plants from the buds present in the margin of leaves.



Fig. Bryophyllum

- Sweet potato and dahlia can give rise to new plants from roots.



Fig. dahlia

- In cactus, new plants are produced when the parts of the plant get detached from the main plant body and each part can give rise to a new organism.



Fig. Cactus

## 2. Budding-

- In unicellular organisms, small bulb-like projections called buds to come out from the body of organisms.
- The bud grows like a chain and detaches from the parent body to form a new organism.
- The new detached cell grows and matures and becomes a new organism.

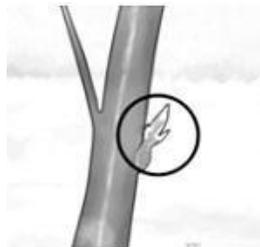


Fig. Budding

## 3. Fragmentation-

- The organisms break down into many fragments.
- The fragments grow into a new organism.
- Example -Spirogyra, a slimy green alga.

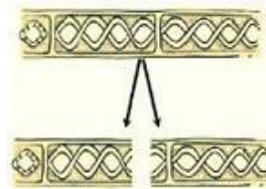


Fig. Fragmentation in spirogyra

## 4. Spore formation-

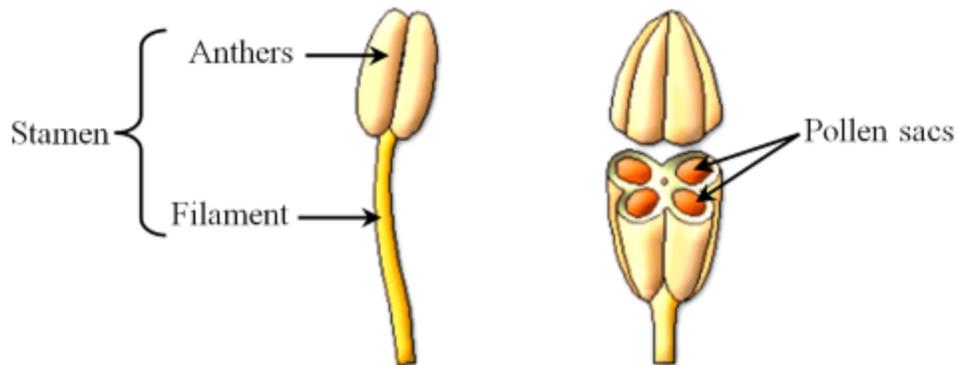
- Spores are special asexual reproductive structures covered by a hard protective coat.
- Spores can withstand unfavorable conditions such as high temperatures with the help of a protective coat.
- Spores can germinate under favorable conditions and can develop into a new individual.
- Spores can float in the air and cover a long distance.

- Example- Moss and ferns.



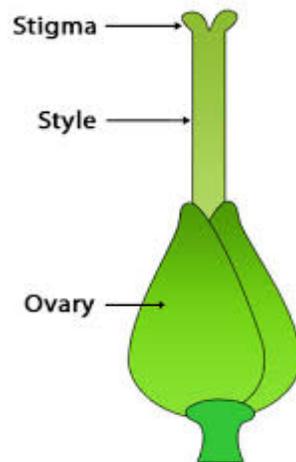
## Sexual Reproduction in Plants

- The flowers of a plant are its reproductive organs that participate in the sexual reproduction process.
- The male reproductive parts of a plant are called **Stamen**.
- The female reproductive parts of a plant are called **Pistil**.
- Some flowers contain both stamen and pistil and are called **Bisexual Flowers**. Eg. Lily, rose, brinjal, hibiscus, petunia, mustard, etc.
- Some flowers contain either the statement or the pistil and hence are called **Unisexual Flowers**. Eg. papaya, watermelon, cucumber, coconut, etc.
- The new plant produced contains the characteristics of both plants that participate in sexual reproduction.
- The stamen consists of **Anther** that has **pollen grains**. These pollen grains produce male gametes.



**Figure 11: Stamen**

- The pistil consists of three parts:
  - **Stigma** – It is a sticky surface where pollen grains get attached.
  - **Style** – It is a tube-like structure that connects the stigma and the ovary.
  - **Ovary** – It contains eggs in which the female gametes or eggs are formed.



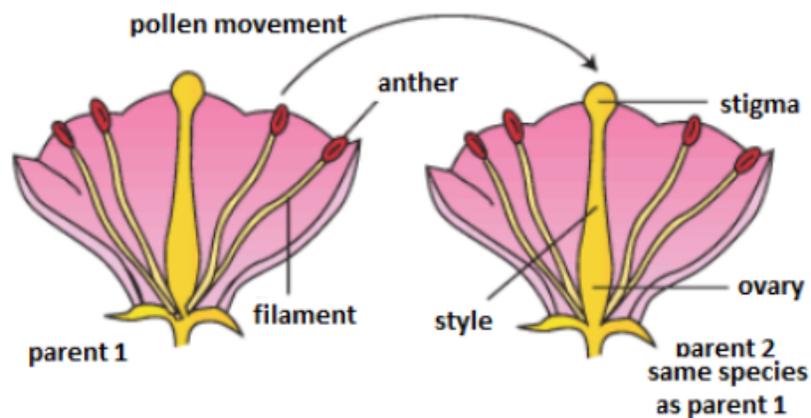
**Figure 12: Pistil**

### How do the male gametes reach the female gametes in plants?

- The male and female gametes fuse and form a **zygote**.
- The male gametes reach the female gametes by the process of pollination.
- The pollen grains have a tough covering which allows them in surviving the different climatic conditions.
- Due to their lightweight, winds, and water often carry them away to different plants.

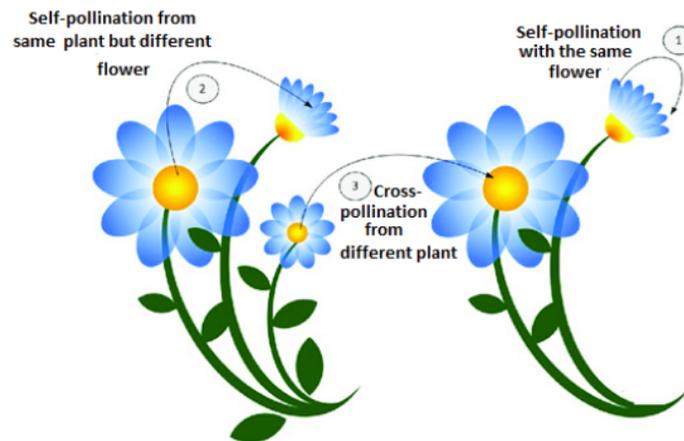
Sometimes the pollen grains also get attached to insects which carry them to different flowers.

- This process of transfer of pollen grains from one stigma to another is called **Pollination**.



**Figure 13: Pollination**

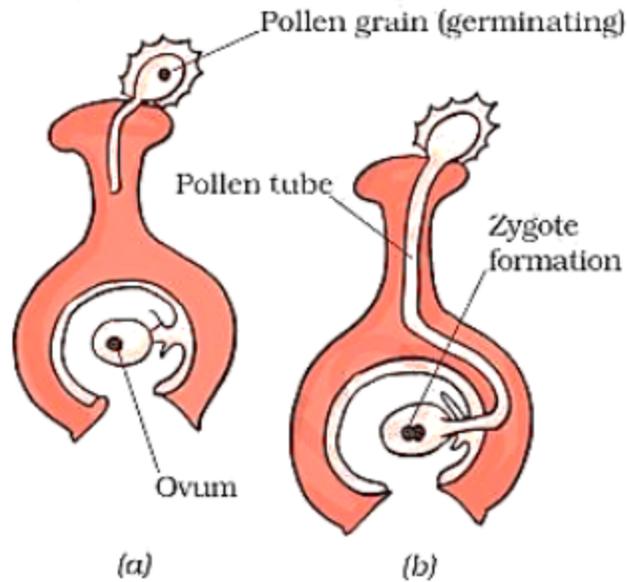
- There are two types of pollination:
  - **Self-pollination/ Autogamy:** When the pollen grains land on the stigma of the same flower.
  - **Cross-pollination/ Xenogamy:** When the pollen grains land on the stigma of a different flower, whether of a similar kind or different kind.



**Figure 14: Self-pollination and Cross-pollination**

## The Fertilization Process

- A zygote is formed as the fusion between the male and female gametes occurs.
- This process of formation of the zygote is called **Fertilization**.
- Then the zygote develops and turns into an embryo.



**Figure 15: Fertilization**

### How fruits and seeds are formed?

- After the fertilization process, the ovary of the flowers grows and develops into a fruit.
- The remaining parts of the flower fall off.
- The ovules develop and form the seeds of the fruits.
- The embryo is enclosed inside the seeds.
- Some fruits are fleshy and juicy such as mango, apple, and orange. Some fruits are hard like almonds and walnuts

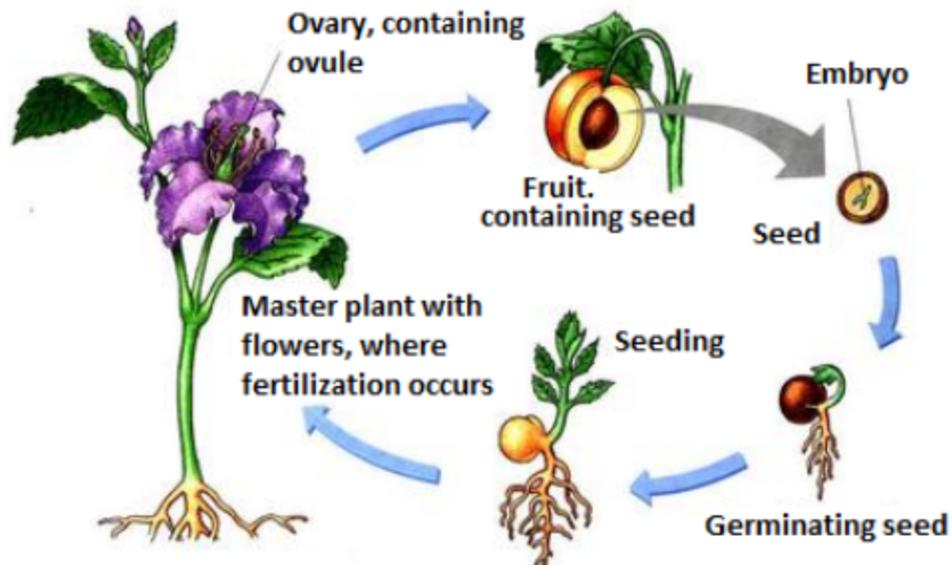


Figure 16: Formation of Fruits and Seeds

## What is seed dispersal?

- The transportation of seeds from the parent plant to different places is called seed dispersal.
- Seed dispersal allows the growth of the same kind of plants in different regions.
- This is helpful because it minimizes the competition for food, sunlight, water, and minerals among the plants of the same kind in the same area.
- It also allows them to grow in different habitats.