Sexual Reproduction in Plants

Sexual Reproduction:

Sexual reproduction is the type of reproduction in plants that involves the fusion of male and female gametes (reproductive cells). It results in genetically diverse offspring. This process occurs through pollination, fertilization, and seed formation.

Structure of a Flower (Reproductive Organ):

A mature flower contains both male and female reproductive parts.

Parts of a Flower:

i. Stamen (Male Part)

- Anther \rightarrow Produces and releases pollen grains (male gametes).
- **Filament** \rightarrow A stalk that supports the anther.

ii. Carpel / Pistil (Female Part)

- Stigma \rightarrow The sticky top of the carpel where pollen grains land.
- **Style** \rightarrow The tube-like structure connecting the stigma to the ovary.
- Ovary → Contains ovules (female gametes). After fertilization, it develops into the fruit.
- Ovule → The structure inside the ovary where the female gamete is present. It later forms the seed.

iii. Other Floral Parts:

- Petal \rightarrow The colorful, fragrant part of the flower that attracts pollinators.
- Sepal \rightarrow Protects the flower bud before it blooms.
- Nectary \rightarrow Produces nectar, attracting insects for pollination.
- Floral Axis \rightarrow The central stalk to which the floral parts are attached.
- **Pedicel** \rightarrow The stalk that supports the flower.

Process of Sexual Reproduction in Plants

Pollination

Pollination is the transfer of pollen grains from the anther (male part) to the stigma (female part) of the same or a different flower.

Types of Pollination:

Self-pollination:

Pollen grains from the anther land on the stigma of the same flower or another flower on the same plant.

Cross-pollination:

Pollen grains from one flower are transferred to the stigma of a different plant of the same species.

Agents of cross-pollination:

- Wind \rightarrow Grass, maize.
- Insects (Bees, butterflies) → Sunflower, rose.
- Animals (bats, birds) → Banana, cactus.
- Water \rightarrow Aquatic plants like water hyacinth.

Fertilization

Fertilization is the process in which the male and female gametes fuse to form a zygote.

After pollination, the pollen grain on the stigma germinates and produces a pollen tube.

The pollen tube carries the male gamete through the style into the ovary.

Inside the ovary:

- The male gamete fuses with the female gamete (ovule).
- This fusion creates a zygote.

Key Steps in Fertilization:

- Pollen grain lands on the stigma.
- Pollen tube grows through the style toward the ovary.
- The male gamete reaches the ovule and fuses with the female gamete.
- The resulting zygote develops into an embryo.

Fruit and Seed Formation

After fertilization:

The ovary develops into the fruit.

The ovules develop into seeds.

All other floral parts (stamens, petals, sepals) dry up and fall off.

Process:

- The zygote develops into an embryo inside the seed.
- The endosperm forms, providing nutrients to the developing seed.
- The fruit forms from the ovary, enclosing the seeds.
- When conditions are favorable, the seeds germinate into new plants.

Key Components of a Seed:

- Seed coat \rightarrow Protects the seed.
- Endosperm \rightarrow Stores food for the growing embryo.
- Embryo \rightarrow Develops into the baby plant (seedling).

Differences Between Pollination and Fertilization:

Pollination	Fertilization
Transfer of pollen grains from anther to stigma.	Fusion of male and female gametes.
Occurs on the flower's surface.	Occurs inside the ovary.
No zygote formation.	Leads to zygote formation.
Facilitated by wind, insects, or animals.	Occurs after pollination.

Importance of Sexual Reproduction in Plants

i. Genetic Diversity:

Offspring are genetically different from the parents, promoting diversity and adaptability.

ii. Evolution and Adaptation:

It allows plants to evolve and adapt to changing environmental conditions.

iii. Formation of Seeds and Fruits:

Produces seeds and fruits, which help in seed dispersal and propagation of the species.

iv. Better Survival Chances:

Genetic variation increases the chances of survival in different environmental conditions.

v. Natural Selection:

Sexual reproduction promotes natural selection, ensuring only the fittest plants survive.

Fun Plant Facts

Vanilla comes from the seed pods of orchids that reproduce sexually.

Apple trees require cross-pollination from a different apple variety to produce fruit.

Coconuts can travel across oceans by floating in water, helping them spread to new locations.

Sunflowers always face the sun due to heliotropism, ensuring efficient pollination.

Bee orchids mimic the appearance and scent of female bees to attract male bees for pollination.

Key Takeaways

Sexual reproduction in plants involves the fusion of male and female gametes.

Pollination transfers pollen from the anther to the stigma.

Fertilization occurs when the male gamete fuses with the female gamete, forming a zygote.

The ovary develops into the fruit, and the ovules develop into seeds.

This mode of reproduction promotes genetic diversity and evolution.