Sexual Reproduction

Introduction to Sexual Reproduction

Sexual reproduction in plants occurs through the fusion of male and female gametes. These gametes are produced in separate male and female reproductive organs, which may be present in the same plant or in separate male and female plants.

Flower: The Reproductive Part of a Plant

A flower is the reproductive structure of a plant. It contains both male and female reproductive organs.

- **Stamens:** The male reproductive parts.
- **Pistil:** The female reproductive part.

Types of Flowers

Bisexual Flowers: Flowers that contain both stamens and pistil. Example: Rose, Mustard.

Unisexual Flowers: Flowers that contain either stamens or pistil. Example: Maize, Papaya, Cucumber.

- Both male and female unisexual flowers may be present in the same plant or in different plants.

Structure of Pistil (Female Reproductive Organ)

The pistil consists of three parts:

Stigma: The sticky top part that receives pollen.

Style: A tube-like structure connecting the stigma to the ovary.

Ovary: The swollen bottom part that contains ovules, where female gametes (eggs) are produced.

The pistil is also known as the carpel.

Structure of Stamen (Male Reproductive Organ)

The stamen consists of two parts:

Filament: The stalk that supports the anther.

Anther: The swollen top part that contains pollen grains.

- Pollen grains contain male gametes and appear as yellow powder.

- Pollen grains have a tough protective coating to prevent them from drying out.

Pollination

Pollination is the transfer of pollen grains from the anther to the stigma of the pistil. It is the first step in the process of seed formation.

Types of Pollination

Self-Pollination: Pollen lands on the stigma of the same flower or a different flower of the same plant.

Cross-Pollination: Pollen lands on the stigma of a flower borne on a different plant of the same kind.

Agents of Pollination

Pollination occurs with the help of external agents:

Wind Pollination: Pollen grains are carried by the wind. Wind-pollinated flowers are usually small and do not have bright colors, scents, or nectar.

Example: Grass, Maize.

Insect Pollination: Insects like bees, wasps, butterflies, and moths transfer pollen while collecting nectar.

Example: Sunflower, Sweet Pea.

Water Pollination: Some aquatic plants rely on water currents to carry pollen.

Example: Hydrilla, Vallisneria, Sea Grass.

Fertilization

After pollination, the following steps occur:

i. Pollen grain lands on the stigma and develops a pollen tube.

ii. The pollen tube grows through the style and reaches the ovary.

iii. The pollen tube carries two male gametes:

- One male gamete fuses with the female gamete (egg) to form a zygote.
- The other male gamete fuses with two polar nuclei to form the endosperm (food storage tissue for the developing seed).

iv. This fusion process is called fertilization.

Post-Fertilization Changes

After fertilization, the flower undergoes several changes:

- The fertilized egg (zygote) develops into an embryo.
- The ovary enlarges and becomes a fruit.
- The ovules develop into seeds.
- Other parts of the flower, such as petals and sepals, wither and fall off.
- The seed contains an embryo enclosed in a protective seed coat.

Seed and Fruit Formation

Seed: A mature ovule that contains an embryo and stored food.

Fruit: A seed-bearing structure, which is the ripened ovary of the flower.

- Fruits can be fleshy and juicy (Mango, Apple, Orange) or stony and hard (Almond, Walnut).