

Chapter 4: Pollination and Fertilization

Pollination: Self and Cross-Pollination

Pollination is the transfer of pollen grains from the anther to the stigma of a flower. It is essential for fertilization and seed formation.

Types of Pollination:

1. **Self-Pollination:** Transfer of pollen from the anther to the stigma of the same flower or another flower on the same plant.
 - **Advantages:**
 - Ensures seed production even in the absence of pollinators.
 - Maintains genetic purity.
 - **Disadvantages:**
 - Reduces genetic diversity.
 - Leads to weaker progeny over time.
2. **Cross-Pollination:** Transfer of pollen from the anther of one flower to the stigma of another flower on a different plant of the same species.
 - **Advantages:**
 - Increases genetic variation.
 - Produces healthier and more adaptable offspring.
 - **Disadvantages:**
 - Depends on external agents (insects, wind, water).
 - Less reliable if pollinators are absent.

Agents of Pollination:

1. **Insects (Entomophily):** Bright, fragrant flowers with nectar attract insects. Pollen is sticky and spiny.
2. **Wind (Anemophily):** Small, light, and non-sticky pollen grains are easily carried by wind. Flowers are often small and inconspicuous.
3. **Water (Hydrophily):** Pollen is transported by water currents. Typically seen in aquatic plants.

Nature's Favor for Cross-Pollination:

- Structural differences between male and female parts.
 - Dichogamy: Staggered maturation of male and female organs.
 - Self-incompatibility: Pollen from the same plant cannot fertilize the ovule.
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Fertilization:

Fertilization is the fusion of male and female gametes to form a zygote.

Process:

1. Pollination leads to pollen grain landing on the stigma.
2. Pollen tube grows through the style, reaching the ovule.
3. The male gamete travels through the tube to reach the embryo sac.

Double Fertilization:

- One male gamete fuses with the egg cell to form a diploid zygote ($2n$).
 - Another male gamete fuses with the polar nuclei to form a triploid endosperm ($3n$).
 - This process is termed **double fertilization**, and the formation of a triploid nucleus is known as **triple fusion**.
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Fruit and Seed Formation:

- **Fruit:** Develops from the ovary after fertilization, protecting the seed and aiding in its dispersal.
- **Seed:** Contains the embryo and stores food for its development.

Significance:

- Ensures continuation of the plant species.
- Seeds are dispersed by various agents, increasing the plant's distribution.