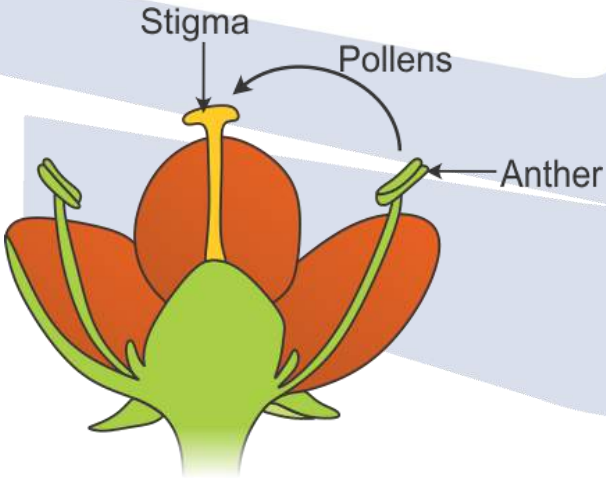
Pollination

Pollination is the act of transferring pollen grains from the male anther of a flower to the female stigma. The process by which pollen grains are transferred from anthers to stigma is referred as pollination.

Modes of Pollination

It is of two types:

1. **Autogamy(Self Pollination)**



- Transfer of pollen grains from the anther to the stigma of same flower is known as autogamy or self- pollination
- Autogamy is the closest form of inbreeding. Autogamy leads to homozygosity.

Mechanism promoting self-pollination

1. **Bisexuality**

- Presence of male and female organs in the same flower is known as bisexuality.
- All the self- pollinated plants have hermaphrodite flowers

2. **Homogamy**

- Maturation of anthers and stigma of a flower at the same time is called homogamy.
- Homogamy is essential for self-pollination.

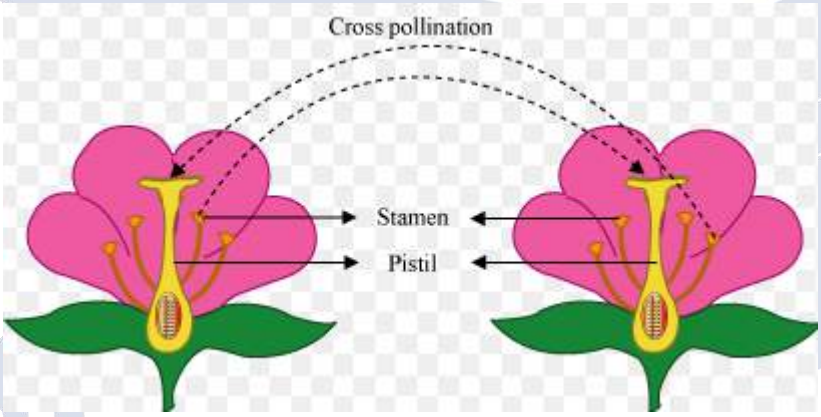
3. Cleistogamy

- Pollination and fertilization occur in unopened flower bud, it is known as cleistogamy. It ensures self - pollination and prevents cross pollination.

4. Chasmogamy

- Opening of flowers only after the completion of pollination is known as chasmogamy.
- Self -pollination and is found in crops like wheat, barley, rice and oats.

2. Allogamy (Cross Pollination)



- Transfer of pollen grains from the anther of one plant to the stigma of another plant is called allogamy or cross pollination.

➢ **Mechanism promoting cross-pollination**

1. **Dicliny**: It refers to unisexual flowers.

It is of two types :

i) monoecy - When male and female flowers are separate but present in the same plants, it is known as monoecy
ii) dioecy - Staminate and pistillate flowers are present on different plants, it is called dioecy.

2. Dichogamy

- It refers to maturation of anthers and stigma of the same flowers at different times.
- Dichogamy promotes cross pollination even in the hermaphrodite species.

It is of two types:

1. **Protogyny**

- When pistil matures before anthers, it is called protogyny such as in pearl millet.

2. **Protandry**

- When anthers mature before pistil, it is known as protandry. It is found in maize, sugar beet.

3. **Heterostyly**

- When styles and filaments in a flower are of different lengths, it is called heterostyly.
- It promotes cross pollination, such as linseed.

4. **Herkogamy**

- Hinderance to self-pollination due to some physical barriers such as presence of hyline membrane around the anther is known as herkogamy
- such as in alfalfa

5. **Self- incompatibility**

- The inability of fertile pollens to fertilize the same flower is referred to as self –incompatibility.
- It prevents self-pollination and promotes cross pollination. Crop species like Brassica, Radish, Nicotiana, and many grass species.
- It is of two types sporophytic and gametophytic.

6. **Male sterility:**

- In some species, the pollen grains are non functional. Such condition is known as male sterility.
- It prevents self-pollination and promotes cross pollination.

Difference between Self-Pollination and Cross-Pollination

Self-Pollination	Cross-Pollination
Transfer pollen grains from the anther to the stigma of the same flower.	Transfer pollen grains from the anther to the stigma of a different flower.
This process can take place in the same flower or a different flower of the same plant.	This process can take place between two flowers present on different plants.
It occurs in the flowers which are genetically identical.	It occurs between flowers which are genetically different.

Few species that exhibit self-pollination – *Paphiopedilum parishii, Arabidopsis thaliana*	Few species that exhibit cross-pollination – apples, daffodils, pumpkins and grasses
Causes homogenous conditions in progenies.	Causes heterozygous condition in progenies.
Self-pollination increases genetic uniformity and decreases genetic variation.	Cross-pollination decreases genetic uniformity and increases genetic variation.
Causes inbreeding.	Causes out breeding.
Reduces the gene pool.	Maintains the gene pool.
Produces limited amounts of pollen grains.	Produces large amounts of pollen grains.
In self-pollination, both the stigma and anther simultaneously mature	In cross-pollination, both the stigma and anther mature at different times.
Transfers a limited number of pollens.	Transfers large numbers of pollen.