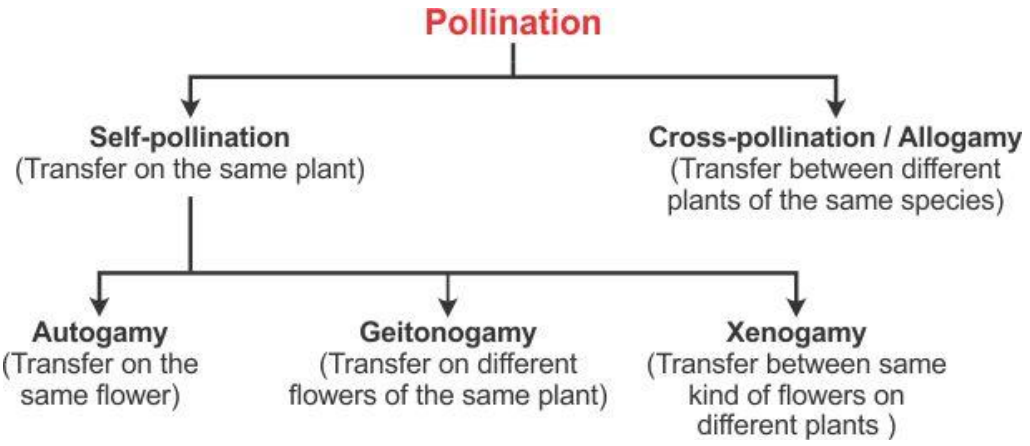
Pollination and Fertilisation

- **Pollination** is the process of transfer of pollen grains from the anther of a stamen to the stigma of a carpel of a flower.



- The transfer of pollen grains from the anther of a flower to the stigma of the same flower or another flower on the same plant is called **self-pollination**. Examples: Wheat, tobacco, pea etc.

- **Conditions favouring Self-Pollination**
  a. Bisexuality, monoecious
  b. Homogamy
  c. Cleistogamy

- The transfer of pollen grains from the anther of a flower on one plant to the stigma of a flower on another plant of the same species is called **cross-pollination**. Examples: *Hibiscus*, china rose, brinjal etc.

- **Conditions favouring Cross-Pollination**
  a. Unisexuality
  b. Self-sterility
  c. Self-poisoning
  d. Heterostyly
  e. Herkogamy
  f. Dichogamy
  g. Protandry
  h. Protogyny

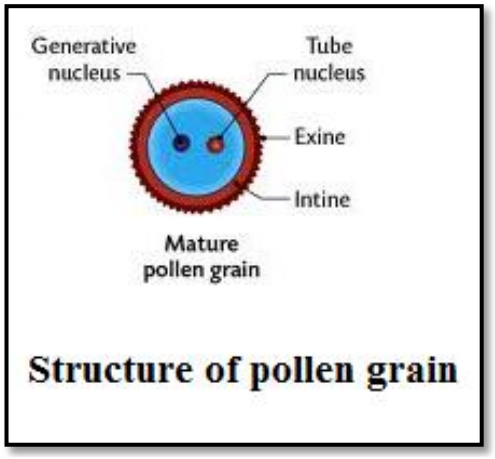
- **Agents of Cross-Pollination**

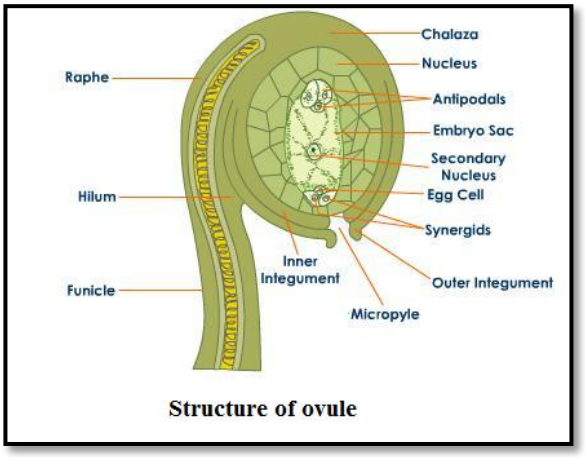
AGENT	METHOD	EXAMPLES OF PLANTS
• Insect	Entomophily	Sweet pea, *Dahlia*
• Wind	Anemophily	Maize
• Water	Hydrophily	*Vallisneria*
• Bird	Ornithophily	*Bignonia*, canna
• Bat	Chiropterophily	*Agave*, *Saguaro*
• Snail	Malacophily	*Volvulopsis nummularium*
• Elephant	Elephophily	*Rafflesia*
• Bee	Melittophily	Apple, almond
• Butterfly	Psychophily	*Asclepias tuberosa*, *Echinacea purpurea*
• Moth	Phalaenophily	*Liatris spicata*, *Camassia scillioides*
• Fly	Myophily/Sapromyophily	*Habenaria obtusata, Trichopoda sp.*
• Beetle	Cantharophily	Pond lily, *Magnolia*

- **Differences between Self-Pollination and Cross-Pollination**

SELF-POLLINATION	CROSS-POLLINATION
• It is the transfer of pollen grains from the anther to the stigma of the same flower.	• It is the transfer of pollen grains from the anther of one flower to the stigma of another flower of a different plant of the same species.
• It does not require any external agent, such as wind, water or insects to carry out pollination.	• It requires an external agent for pollination to occur.
• It can take place even when the flower is closed.	• It can occur only when the flower is open.
• In self-pollinated flowers, the anther and stigma mature at the same time.	• In cross-pollinated flowers, the anther and stigma mature at different times.
• It preserves parental characters.	• It does not preserve parental characters.
• New varieties cannot be produced.	• New varieties can be produced.
• As new variations are not possible, the offsprings cannot adapt to changing environmental conditions.	• As new variations are possible, the offspring are healthier and are able to adapt to changing environmental conditions.

- **Fertilisation** is the fusion of the male gamete present in the pollen with the female gamete or the egg present in the ovule.





- **Events in Fertilisation**

The pollen grains germinate after falling on the stigma of the same plant species.

↓

The pollen tube grows out of the pollen grain.

↓

The generative nucleus divides into two nuclei.

↓

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

↓

It pushes through the micropyle and reaches the embryo sac.

↓

The tube nucleus eventually disintegrates.

↓

The pollen tube enters one of the synergids and releases two sperm nuclei.

↓

One sperm nucleus enters the egg cell and fuses with its nucleus.

↓

The other sperm nucleus moves towards the two polar nuclei and fuses with them.

- **Fate of Floral Parts After Fertilization**

FLORAL PART	FATE
• Sepals	Usually wither away, but in some cases these remain attached to the fruit. Examples: Brinjal, tomato etc.
• Petals	Wither away
• Stamens	Wither away
• Style	Withers away
• Stigma	Withers away
• Ovary	Fruit
• Ovary wall	Pericarp
• Ovule	Seed
• Placenta	Stalk of the seed
• Outer integument	Testa (seed coat)
• Inner integument	Tegmen (seed coat)
• Secondary nucleus	Endosperm
• Egg cell and synergids	Embryo
• Antipodal cells	Disorganised