
# Self and Cross pollination

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# Self pollination

# Self pollination

- Involves the transfer of pollen grains from the anthers to the stigma of the same flower or of another flower borne by the same plant.

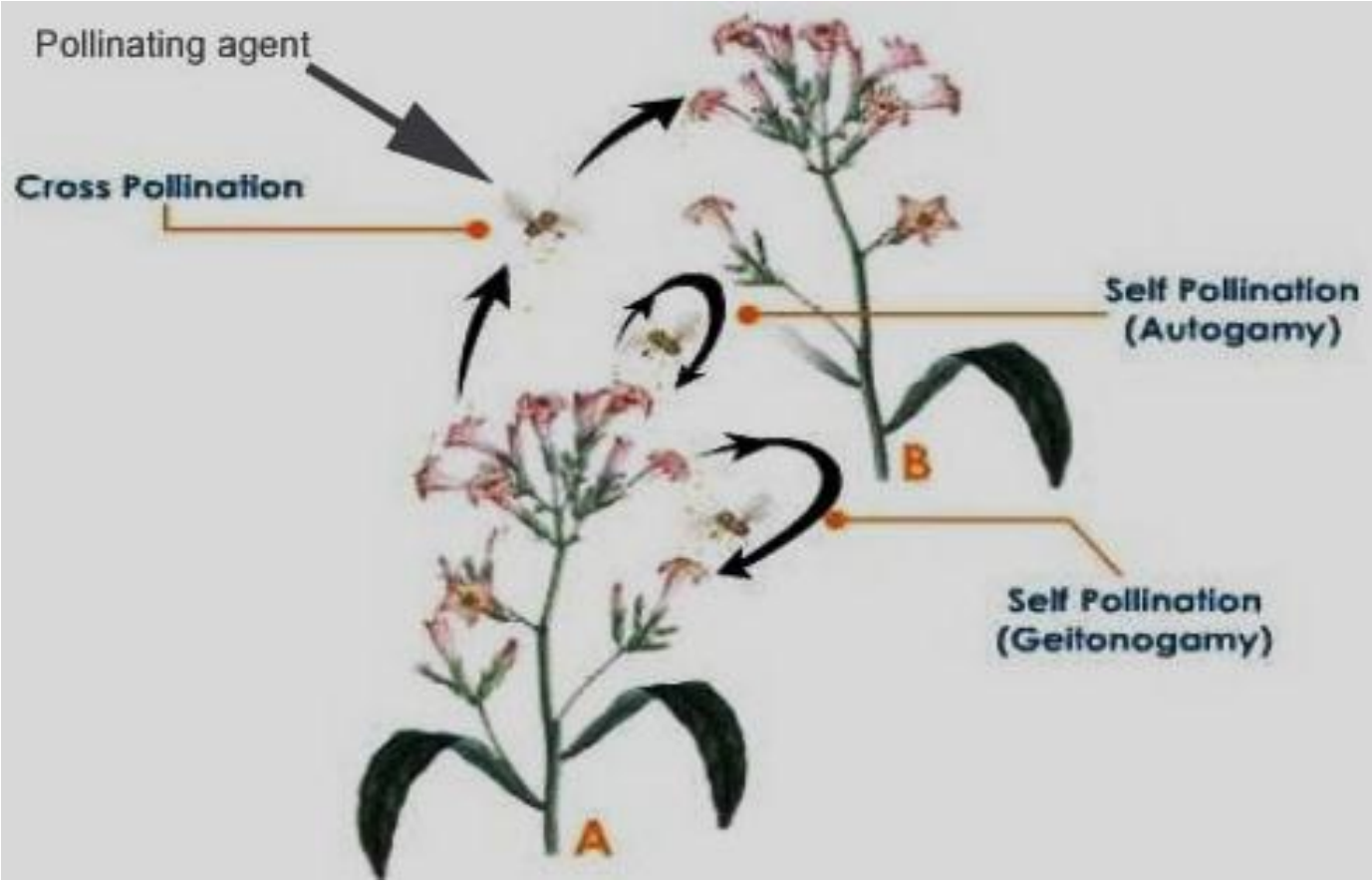
It is of two types :

## (i) Autogamy

- Pollen from the anthers of a flower are transferred to the stigma of the *same flower*.

## (ii) Geitonogamy

- Pollen from the anthers of one flower are transferred to the stigma of another flower borne on the same plant.
- *Involves two flowers belonging to the same parent plant.*
- Usually occurs with monoecious condition.




Different forms of self pollination: Autogamy and Geitonogamy

## Merits

- Pollen grains are not wasted.
- The purity of the generation is maintained.

## Demerits

- New and healthier varieties are not formed.
- Results in weak progenies, producing weaker seeds and plants.

# Contrivances for self pollination

# Contrivances for self pollination

## (a) Bisexuality

- Flowers should be bisexual or hermaphrodite.

## (b) Homogamy

- *Anthers and stigma* of the bisexual flowers *mature at the same time*.

- They are brought close to each other by growth, bending or folding to ensure self pollination.

- This condition is called homogamy.
  - *Mirabilis* (Four O, clock)
  - *Catharanthus*
  - Potato
  - Sunflower
  - Wheat

## (c) Cleistogamy

- Some plants never open to ensure complete self-pollination.

Examples:

- *Commelina bengalensis*
- *Oxalis*
- *Viola*

- Cleistogamous flowers are:
  - bisexual small
  - Inconspicuous
  - colourless
  - do not secrete nectar

# Cross pollination

# Cross pollination (Xenogamy)

Involves the transfer of pollen grains from the flower of one plant to the stigma of the flower of another plant.

## Merits

- Seeds are more and viable.
- Progenies are healthier.
- Adaptability is better.
- New varieties can be produced.

## Demerits

- The process is not definite because plants depend on external agencies.
- Large amount of pollen grains are wasted.


Cross pollination (Image courtesy: Shutterstock.com)

# Contrivances for cross pollination

# Contrivances for cross pollination

- Nature favours cross pollination.
- All unisexual flowers and a large number of bisexual flowers are naturally cross pollinated.

The main contrivances ensuring cross pollination are as follows:

**(i) Diclincy or Unisexuality:** In unisexual flowers stamens and carpels are found in different flowers.

Unisexuality can be of two types:

**Monoecious plant :** When male and female flowers are borne on the same plant. *e.g.*, Maize, Cucurbits, Castor.

**Dioecious plant :** When male and female flowers are borne on different plants. *e.g.*, *Carica papaya*, *Cannabis*.

## (ii) Dichogamy

- In bisexual flowers, when *two sexes mature at different intervals* and thus avoid self pollination is known as dichogamy.

## Protandry

- When stamens mature earlier than the stigma.

  *Examples:*

  - Coriander
  - Jasmine
  - Sunflower
  - Lady's finger

## Protogyny

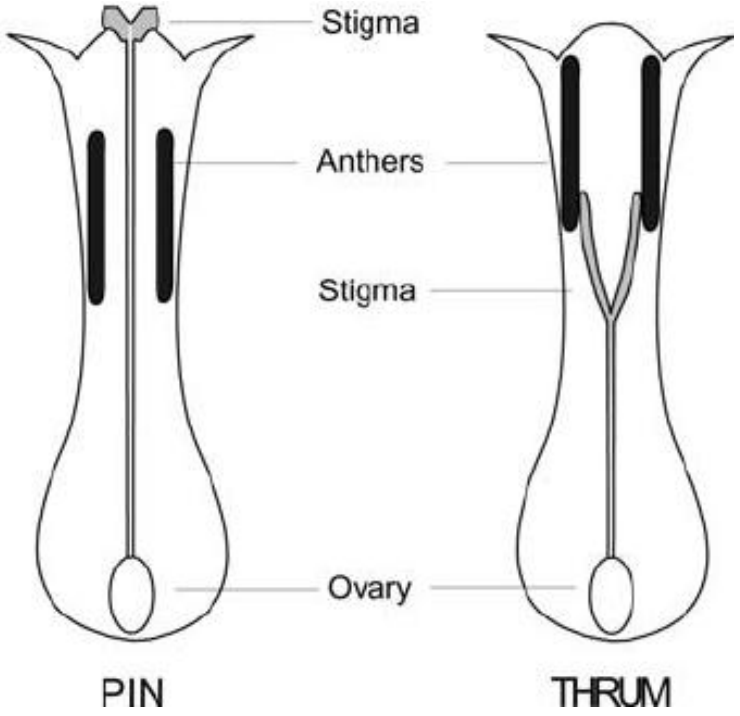
- When stigma matures earlier than the stamens.

  Examples:

  - Rose
  - Tobacco
  - Crucifers

## (iii) Heterostyly

- *Flowers are dimorphic*.
- *Pin-eyed:* long style but short stamens.
- *Thrum-eyed:* short style and long stamens.
- Example: *Oxalis*.




**Heterostyly**

## (iv) Herkogamy

- Stigma and anthers mature at the same time.
- Self pollination is avoided by some sort of barrier.
- The flowers show following contrivances :
  - The male and female sex organs lie at some distance from each other.
  - In some flowers corolla has peculiar forms which act as barrier in self pollination. *e.g.*, *Aristolochia*.
  - In some other flowers, the pollens are held together to form pollinia which can only be carried away by insects.
    *Example:* Orchids and *Calotropis*.

## (v) Self sterility or Incompatibility

- Pollen grain of an anther do not germinate on the stigma of the same flower.
- Such flower is called self sterile or incompatible and this condition of flower is called self sterility.
- Also termed as intraspecific incompatibility or self incompatibility.
- In these flowers cross pollination is the only means for fertilization and production of seeds.

# Agents for cross pollination

# Agents for cross pollination

There are two main groups of agents:

## (i) Abiotic

- Wind
- Water

## (i) Biotic

- Insects
- Birds
- Bats
- Snails

# Abiotic agents

## (a) Anemophily

- Pollinated by *wind*.
- Flowers are:
  - small and inconspicuous
  - with long and versatile stamens.
- Examples:
  - Sugarcane
  - Maize
  - Wheat
  - Bamboo
  - *Pinus*
  - Papaya
  - Grasses
  - Mulberry
  - *Chenopodium*

## (b) Hydrophily

- Pollination takes place through ***water***.
- All aquatic plants are not hydrophilous.

Hydrophily is of two types:

- Hypohydrophily
  - ✓ Plants which are pollinated inside the water.
  - ✓ *Examples:*
    - ❖ *Zostera*
    - ❖ *Ceratophyllum*
    - ❖ *Najas*

- Epihydrophily
  - ✓ Plants which are pollinated outside the water.
  - ✓ *Examples:*
    - ❖ *Vallisneria* (Ribbon weed)

# Biotic agents

## (a) Entomophily

- Pollination brought about by *insects*.
- Moths, beetles, butterflies, wasp, etc.
- Flowers: brightly coloured, sweet smell, nectar.
- Flowers produce a small amount of pollen which has a spinous and sticky exine.
- The stigmas of such flowers are long rough and sticky.

Examples:

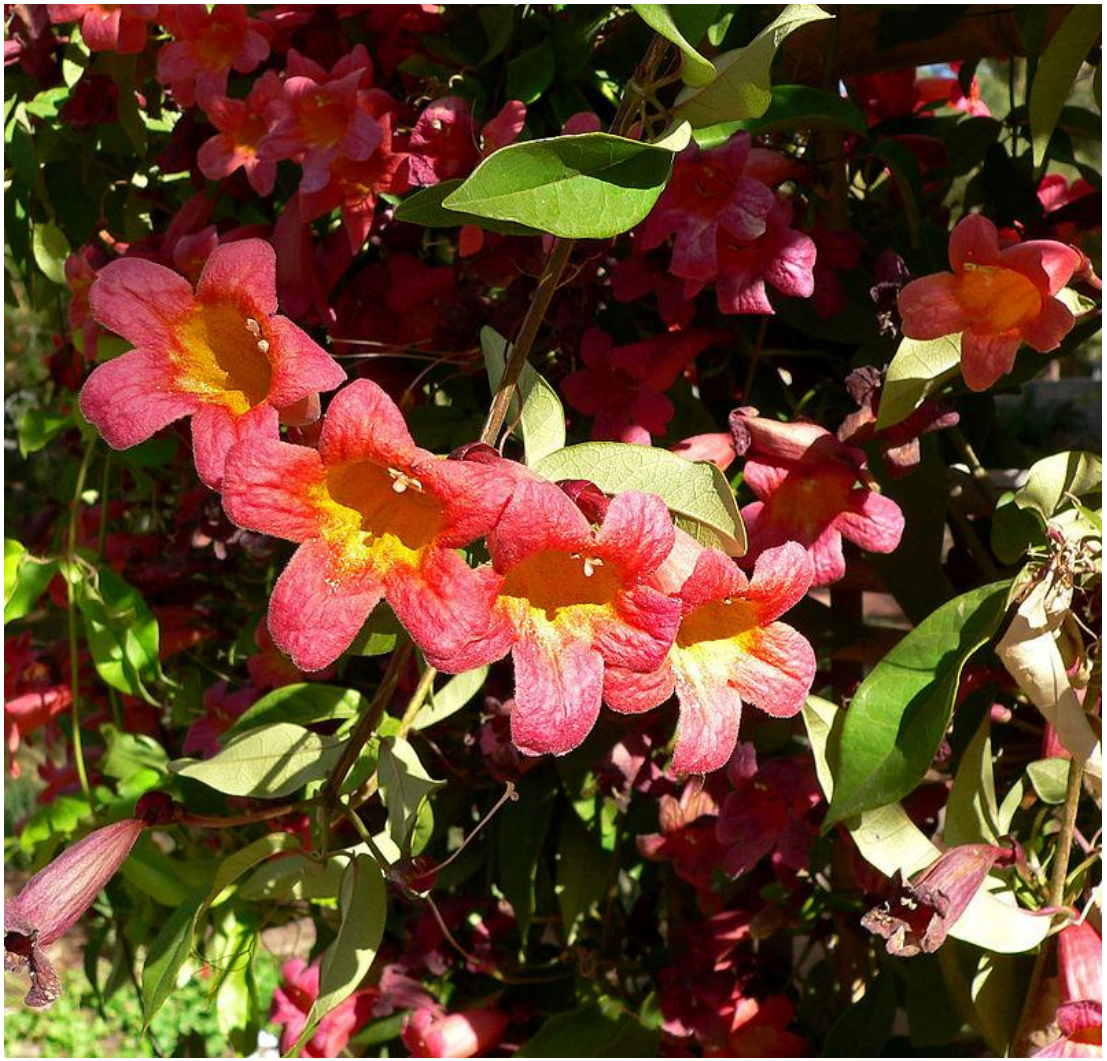
- *Salvia*: Lever or turn pipe mechanism
- *Yucca* (by *Tageticula* moth),
- Orchid *Ophrys speculum* (by *Colpa aurea*, a hairy wasp),
- *Ficus* (by *Blastophega*)

## (b) Ornithophily

- Pollinated by *birds*.
- Common bird pollinators: Sun bird, Humming bird, Crow, Bulbul, Parrot, Mynah, etc.
- Examples: *Bombax* (red silk cotton), *Erythrina* (Coral tree), *Callistemon* (Bottle brush), *Bignonia*, *Agave*, etc.
- Flowers: brightly coloured; plenty of nectar; large quantities of pollen.

- Humming bird pollinates while hovering over the flowers and sucking nectar.
- The bird can derive about half of its body weight of nectar in a single day.
- The nectar is chiefly made of sugars and provides a sweet drink to the bird.


***Bombax* (red silk cotton)** (Image courtesy: Shutterstock.com)

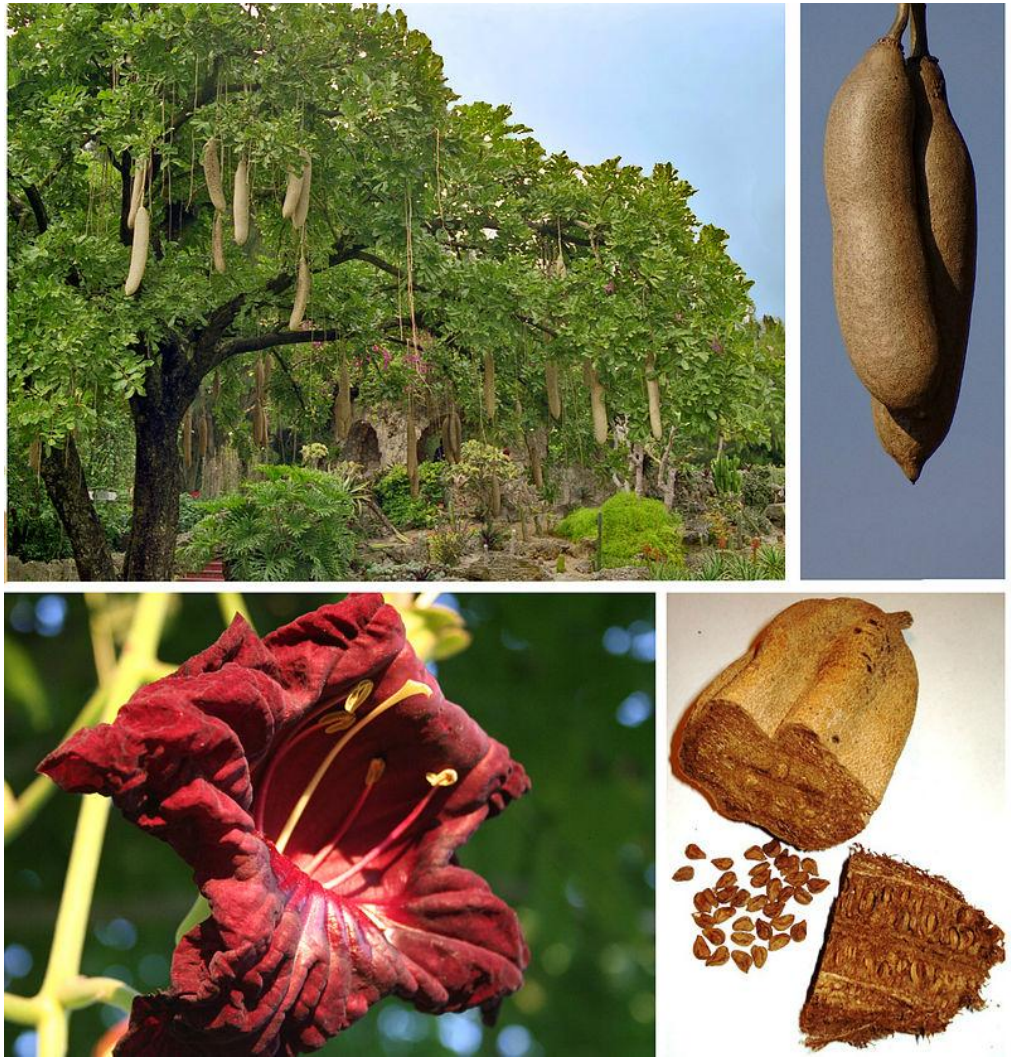


***Bignonia*** (Image courtesy: Wikipedia)

## (c) Chiropterophily

- Pollination performed by *bats*.
- Flowers: large, dull-coloured, have a strong scent.
- Chiropterophilous flowers produce abundant pollen grains.
- Flowers secrete more nectar than ornithophilous flowers and open at night emit a good fragrance.
- Examples:
  - *Kigelia pinnata* (Sausage tree)
  - *Adansonia* (Baobab tree)
  - *Bauhinia megalandra*
  - *Anthocephalus* (Kadamb tree)

***Adansonia*** (Image courtesy: Wikipedia)



***Kigelia*** (Image courtesy: Wikipedia)

## (d) Malacophily

- Pollination by *slugs and snails*.
- Land plants like *Chrysanthemum* and water plant like *Lemna* shows malacophily.

## (e) Myrmecophily

- Pollination by ants.
- Example: *Anemone nemarosa*.