

CHAPTER 5 - POLLINATION AND FERTILIZATION

This lesson is for Class 8 for the subject of Biology.
Topic - 'Pollination and its types' which is covered in
Chapter 5 Pollination and Fertilization starting on
Page No 38 of your text book titled Concise Biology
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Dear students in the previous chapter we have learnt that the main purpose of flower is reproduction of the plant, which requires the fusion of male reproductive cells [i.e. pollen grains] with female reproductive cells [i.e. ovules]. For the fusion of pollen grains with the ovules to occur it requires transference of pollen grains from anthers to stigma of the flower which is called the pollination.

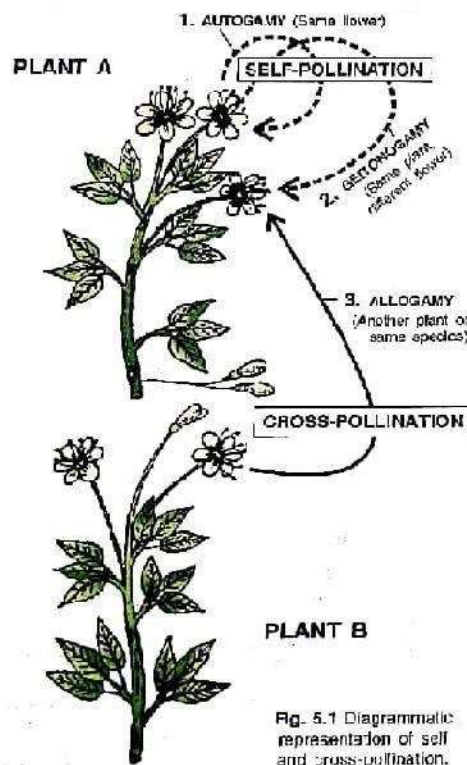


Fig. 5.1 Diagrammatic representation of self and cross-pollination.

Pollination - is the process of transference of pollen grains (male gametes) from anthers to the stigma.

Pollination is the first step for initiating the process of seed formation.

Different ways in which pollination occurs -

- (i) Autogamy - Process in which the pollen grains of same flower falls on its own stigma by itself.
- (ii) Geitonogamy - The pollen grains are transferred from one flower to another flower of same plant.
- (iii) Allogamy - The pollen grains are transferred from the anthers of one flower to the stigma of another flower of another plant of the same species. It is important to note here that pollination occurs between the plants of same species i.e. anthers of rose plant cause pollination only if they fall on the stigma of rose plant. Nature has so designed that only the pollen of the same species of plant will survive and grow further to continue the process of reproduction and rest of the types of pollen will fail to germinate and die.

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KINDS OF POLLINATION

- [A] (i) Self Pollination - is the transfer of pollens from the anthers to the stigma of the same flower (autogamy) or to the stigma of another flower of the same plant (geitonogamy). Hence self pollination occurs within the same plant having the same genetic constitution, i.e. the general characteristics/features of any one plant are same in the different flowers borne on it.
- CLEISTOGAMY - In some flowers like pansy flowers do not open at all, hence the anthers and stigma lie close to each other, maturing at the same time causing self pollination.

Conditions for self pollination to occur -

- (i) A bisexual flower where anthers and stigma mature at same time.
- (ii) Or unisexual flowers - where both male and female flowers are borne on the same plant and mature at the same time as well.

ADVANTAGES OF SELF POLLINATION -

- 1) Pollination is much surer as anthers & carpels mature at same time.
 - 2) Parental characters are preserved indefinitely as the genetic composition remains same within one plant.
 - 3) There is no wastage of pollens if transfer has to take place within one flower or another flower of same plant.
 - 4) Flowers need not be large and showy as the self pollination requires little movement of pollens. Hence does not need to attract insects for pollination. Pollination may occur on its own under the effect of gravity / wind etc.
 - 5) For the same reason scent and nectar need not be produced by the flowers (No need to attract insects).
- All these advantages are of great economy to the plant. Plant saves its nutrients which may otherwise be used in production of pollen, nectar, scent, large petals etc.

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Disadvantages of self pollination

- 1) Continued self pollination (within same plant with same genes) generation after generation leads to weakening of the plant variety or the species. Seeds produced are poor in quality and gives rise to less vigorous offsprings.
2. There is no intermixing of the genes/genetic characters occurring in self pollination. Hence weaker/defective characters of the variety/breed cannot be eliminated.
- 3 It does not yield new varieties. Self pollination occurs within same plant (having same genetic characters) hence no intermixing of genes leading to no formation of new varieties. Thus there is little chance for improvement of characters in next generation.

Now before going further let us take a short break.
Answer the following questions during the break.

Q.1. Name the following -

- (a) Transference of pollen grains from the anther to the stigma of the same flower.
- (b) Transference of pollen grains from the anther to the stigma of another flower of the same plant.
- (c) Transference of pollen grains from the anther to the stigma of another flower of another plant.

Break is over children. Listen to the correct answers -

Ans 1 (a) Autogamy

(b) Geitonogamy

(c) Allogamy

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[B] CROSS POLLINATION

It is the transfer of pollen grains from anthers of one flower to the stigma of another flower of another plant of same species.

ADVANTAGES OF CROSS POLLINATION

1. The offsprings produced by cross pollination are healthier
2. Seed produced are abundant (more) and viable
3. New varieties of the plant may be produced as the pollination occurs between two different flowers of two different plants (having different genetic composition).

DISADVANTAGES OF CROSS POLLINATION

1. Pollinating agent is always needed to transfer the pollens from one plant to another. Hence it is not always sure.
2. There is a lot of wastage of pollen grains while transferring them from one plant to another.
3. The process is uneconomical for the plant as the flowers need to be large, coloured, scented, showy with nectar to attract pollinating agents.

Students are required to learn and write the differences between self and cross pollination Table 5.1

NATURE FAVOURS CROSS POLLINATION :-

There are certain conditions in nature which favours only cross pollination to occur in a flower -

- 1) UNISEXUALITY - If the flowers are unisexual (either male/female) and are borne on separate plants (i.e. Dioecious plant) then only method of pollination is cross pollination Eg Papaya
- 2) DICHOGAMY - means there is different timings of maturation of (androecium and gynoecium) male and female parts of the flower. For eg- (a) Protandry (anthers maturing earlier than stigma) occurs in sweet pea, sunflower. (b) Protogyny (stigma matures earlier than the anthers) occurs in peepal, custard apple etc.

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- 3) Self STERILITY - In this case if the stigma receives the pollens from the anthers of the same flower, then the flower fails to undergo further growth. Eg - Orchids.
- 4) HERKOGAMY - In these flowers the pollens of a flower cannot reach the stigma of the same flower because of presence of some mechanical/structural barrier. Eg Hood covering stigma acts as a mechanical barrier in Pansy flowers.
- 5) HETEROSTYLY - In these flowers stigma and anthers grow at different heights which does not favour self pollination. Eg Prim rose, Oxalis.

NOTE FOR STUDENTS -

After reading the notes, please go through the topic as discussed in the Ch. 5 of the book carefully with understanding. It may require multiple readings to grasp the topic completely.

Home assignment

- 1. Learn and write the differences between self and cross pollination as given in Table 5.1. in notebook.
- 2. Write down the answers to Question No C.3 (short answer type questions) and Question No D.2. (Long answer type question) in the notebook. (Review questions Ch. 5).
- C. Short Answer type
- Q 3. Mention any two contrivances in flower which favours cross pollination.
- D Long Answer type
- Q 2 Describe the advantages and disadvantages of cross pollination to the plant.