Pollination

1 Mark Questions

1.What is pollen-pistil interaction and how is it mediated? [Foreign 2014]

Ans. Pollen-pistil interaction is a chain or group of events that takes place from the falling of pollen over the stigma to the formation of pollen tube and its entry into the ovule. It is basically the phenomenon of acceptance or rejection of pollen grains by the pistil (stigma), which is mediated by chemical components of pollen grain, interacting with that of pistil,

2.Differentiate between xenogamy and geitonogamy? [Delhi 2014 c]

Ans.Xenogamy is transfer of pollen grains from anther of one flower to stigma of another flower of a different plant, while geitonogamy is transfer of pollen grains from anther of one flower to stigma of another flower on same plant.

3.How do the pollen grains of Vallisneria protect themselves?[All India 2012]

Ans.As the pollination of **Vallisneria** takes place by means of water, the pollen grains are covered by mucilaginous coating that protects them

4.Why do the pollen grains of Vallisneria have a mucilaginous covering? [hots; Delhi 2010]

Ans.In Vallisneria,the male flowers are released on the water surface. So, to provide protection to these pollen grains, a mucilaginous covering is present. True hydrophily can be seen in **Vallisneria.**

5.Mention the pollinating agent of an inflorescence of small dull coloured flowers with well exposed stamens and large feathery stigma. Give any one characteristic of pollen grains produced by such flowers. [Delhi 2009]

Ans. The pollinating agent in the described inflorescence with small dull coloured flowers having well exposed stamens and large stigma is wind. The pollens are non-sticky and can be easily dispersed by wind currents and so large, feathery stigma easily traps air borne pollen grain.

For example, corn cob, its ears or silk (stigma and style) wave in the wind to trap pollen grains.

6.Name the type of flower which favours cross-pollination. [All India 2009]

Ans.Chasmogamous flowers which are similar to flowers of other species with exposed anthers and stigma favour cross-pollination.

7.The following statements (i), (ii) and (iii) seem to describe the water pollinated submerged plants. Which one of these statements is incorrect?

(i)The flowers do not produce nectar.

(ii)The pollen grains have mucilaginous covering.

(iii)The brightly coloured female flowers have long stalk to reach the surface. [Foreign 2009]

Ans. Statement (iii) is incorrect. As in submerged plants, female flowers remain submerged, while pollen grains are long ribbon-like to reach passively to stigma inside water, so as to achieve pollination.

8.Name the type of pollination as a result of which genetically different types of pollen grains of the same species land on the stigma.[Foreign 2009]

Ans.Xenogamy/allogamy is the type of pollination as a result of which genetically different types of pollen grains of the same species land on the stigma.

2 Marks Questions

9.In angiosperms, zygote is diploid while primary endosperm cell is triploid. Explain. [All India 2013]

or

Mention the reasons for difference in ploidy of zygote and primary endosperm nucleus in an angiosperm. [Delhi 2010]

Ans.In angiosperms or flowering plants, one of the male gamete fuses with egg cell which results in formation of zygote. So, zygote is diploid.While primary endosperm cell is triploid because the nucleus of the second male gamete fuses with the two haploid polar nuclei or diploid secondary nucleus of the central cell to form a triploid primary endosperm nucleus. The central cell is now called primary endosperm cell.

10.State one advantage and one disadvantage of cleistogamy.[All India 2012]

Ans. Advantage and disadvantage of cleistogamy are as follows:

Advantage Cleistogamous flowers produce assured seed-set even in the absence of pollinators.

Disadvantage Cleistogamous flowers are invariably autogamous. So, there is no chance of cross-pollination.

11.Why should a bisexual flower be emasculated and bagged prior to artificial pollination? [Foreign 2010]

Ans.Emasculation in a bisexual flower is required to prevent contamination of the stigma with self pollen grains.Bagging is done to prevent contamination of the stigma of the emasculated flower with any other unwanted pollen grains. That's why a bisexual flower should emasculated and bagged prior to artificial pollination

12.Explain any two devices by which autogamy is prevented in flowering plants. [All India 2009]

Ans.The two devices to prevent autogamy in flowering plants are:

(i) Anthers and stigma of a flower are placed in such a way that pollen of the same flower cannot fall on the stigma.

(ii) Self-incompatibility is a genetic process that prevents germination of pollen from the same flower on the stigma

13.The flower of brinjal is referred to as chasmogamous, while that of beans is cleistogamous. How are they different from each other? [Delhi 2008]

Ans. Differences between chasmogamous flower of brinjal and cleistogamous flowers of beans are:

Chasmogamous flower	Cleistogamous flower
These open at maturity and expose their stigma(s) and stamen(s).	These are bisexual flowers which do not open at all even in maturity.
They may be cross pollinated or self pollinated.	Self pollinated only.

14.What is geitonogamy? Give its one similarity to

(i)Autogamy (ii) Xenogamy. [Delhi 2008]

Ans. (i) Geitonogamy is pollen from onethe condition in which flower are deposited on the stigma of another flower borne on the same plant.

(ii) (a) **Similarity to autogamy** In autogamy, pollination is achieved within the same flower or plant (genetic similarity).

(b) **Similarity to xenogamy** Pollen grains are transferred from anther to the stigma of a different flowers, which shows genetic dissimilarity (as in xenogamy).

3 Marks Questions

15.Make a list of any three outbreeding devices that flowering plants have developed and explain how they help to encourage cross pollination. [All India 2014]

Ans. The three outbreeding devices that flowering plants have developed, so as to encourage cross-pollination are:

(i)Receptivity of stigma and release of pollen grain is not synchronised, i.e. stigma becomes receptive much before pollens are released or after they are released to avoid self-pollination.

(ii) Self-incompatibility, a genetic mechanism to prevent pollens from fertilising ovules of same flower by inhibiting their germination on stigma or pistil.

(iii) Production of unisexual flowers so that male and female parts will be present on different plants (dioecious) or on different flowers in same plant (monoecious). It prevents both autogamy and geitonogamy.

16.Explain the phenomenon of double fertilisation. [Delhi 2014]

Ans.The phenomenon of double fertilisation occur in following steps:

(i) In an angiospermic plant, two male gametes are discharged by a pollen tube into the embryo sac.

(ii) One of the male gametes fuses with the egg to form a zygote. This process is called syngamy.

(iii) Other male gamete fuses with the secondary nucleus to form the primary endosperm nucleus, this process is called triple fusion.

(iv) Since, there are two fusions (syngamy and triple fusion), inside an ovule during fertilisation, it is known as double fertilisation

17.Write the differences between wind pollinated and insect pollinated flowers. Give an example of each type. [Foreign 2014]

Ans. The differences between wind pollinated and insect pollinated flowers are:

Wind pollinated	Insect pollinated
These are small.	They are either large or grouped to form large clusters.
Usually inconspicuous due to dull colours.	The presence of bright colours in corolla, calyx or bracts to attract insects.
They are odourless and devoid of nectar.	Strongly odoured and usually possess nectar or edible pollen.
Pollens are produced in large numbers.	Fewer pollen grains are produced.
Examples *Urtica*, Maize, *Parthenium*.	Exmaples Rose, Snapdragon, *Calotropis*.

18.Name two end products of double fertilisation in angiosperms. How are they formed? Write their fate during the development of seed. [Delhi 2014c]

Ans.The two end products of double fertilisation in angiosperms are diploid zygote and a

triploid primary endosperm nucleus.
Diploid zygote is formed by fusion of haploid gametes, i.e. male gamete and egg, while another male gamete and two polar nuclei of central cell fuses to form triploid primary endosperm nucleus.
During the development of seed, the zygote undergoes mitotic divisions to form a mature embryo while, the primary endosperm cell gives rise to nutritive tissue called endosperm, which provides nourishment to growing embryo.

19.Differentiate between geitonogamy and xenogamy in plants. Which one between the two will led to inbreeding depression and why?[Delhi 2011]

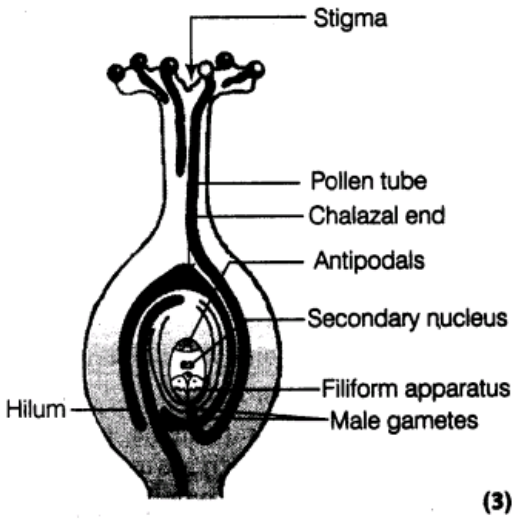
Ans. Differences between geitonogamy and xenogamy are:

Geitonogamy	Xenogamy
It is the transfer of pollen grains from the anther to the stigma of another flower of same plant.	It is the transfer of pollen grains from the anther to the stigma of different plants.
The pollen grains are genetically similar to the plant.	The pollen grains are genetically different from the plant.

Geitonogamy will lead to inbreeding depression because the pollen grains are genetically similar resulting into inbreeding. Continuous inbreeding reduces fertility.

20.Draw a Longitudinal Section (LS) of a post-pollinated pistil showing entry of pollen tube into a mature embryo sac. Label filiform apparatus, chalazal end, hilum, antipodals, male gametes and secondary nucleus. [Delhi 2010]

Ans. Longitudinal Section (LS) of a post-pollinated pistil is given below:



(3)

21.(i) Write the characteristic features of anther, pollen and stigma of wind pollinated flowers.

(ii)How do flowers reward their insect pollinator? Explain.[All India 2010]

Ans.In wind pollinated flowers:

(i) (a) Anthers are well exposed for easy dispersal of pollen grains.

(b)Pollen grains are light and non-sticky, so that they can be transported by wind currents.

(c)Stigma is large and feathery to trap pollens.

(iii)Flower rewards their insect pollinators easily by offering: –

(a)Nectar and edible pollen grains.

(b)Safe place for insects to lay eggs by some flowers, e.g. Amorphophallus and Yucca.

22.(i) Mention any four strategies adopted by flowering plants to prevent self-pollination.
(ii)Why is geitonogamy also referred to as genetically autogamy?[All India 2009]

Ans.(i) Strategies to prevent self-pollination are:

(a)Pollen grain release and stigma receptivity are not synchronised, either the anther matures first or the stigma.

(b)Anther and stigma are placed at different positions, so that the pollens cannot come in contact with the stigma of same flower.

(c)A genetic mechanism called self-incompatibility, which prevents self-pollen from fertilising the ovules either by inhibiting pollen germination or by retarding the growth of pollen tube in the pistil.

(d)By producing unisexual flowers. Plants are dioecious and continued self-pollination may cause inbreeding depression.

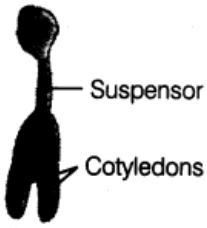
(ii) Geitonogamy is referred to as genetically autogamy because the pollen grains come from the same plant, though from a different flower.

23.(i)Identify the figure.
(ii)Name the initial cell from which this structure has developed.
(iii)Draw the next mature stage and label the parts.[Foreign 2009]

Ans.(i) It is a globular embryo of a dicot plant.

(ii)Zygote

(iii)Next mature stage



Mature embryo of a dicot plant

24.State the significance of pollination. List any four differences between wind pollinated and insect pollinated flowers. [Delhi 2008 C]

Ans. Significance of pollination are:

(i) Pollination is a pre-requisite for fertilisation in plants.

(ii) It brings male gametes for fertilisation.

(iii) It helps in recombinations.

(iv)It helps in developing hybrid seeds.

The differences between wind pollinated and insect pollinated flowers are:

Wind pollinated	Insect pollinated
These are small.	They are either large or grouped to form large clusters.
Usually inconspicuous due to dull colours.	The presence of bright colours in corolla, calyx or bracts to attract insects.
They are odourless and devoid of nectar.	Strongly odoured and usually possess nectar or edible pollen.
Pollens are produced in large numbers.	Fewer pollen grains are produced.
Examples *Urtica*, Maize, *Parthenium*.	Exmaples Rose, Snapdragon, *Calotropis*.

25.Enumerate any six adaptive floral characteristics of a wind pollinated plant. [MI India 2008 C]

Ans.Floral characteristics of a wind pollinated plant are:

(i) Well exposed stamens for the pollen grains to be carried away easily.

(ii) Stigmas are often large and feathery to easily trap the wind-borne pollen grains.

(iii) Flowers normally packed together as an inflorescence.

(iv) Pollen grains are light and non-sticky.

(v)Normally, a single ovule is present in the ovary.

(vi)Non-essential whorls, calyx and corolla are much reduced or absent.

5 Marks Questions

26.Angiosperm flowers may be monoecious, cleistogamous or show self incompatibility. Describe the characteristic features of each one of them and state. Which one of these flowers promotes inbreeding and outbreeding respectively. [All India 2014 c]

Ans.The characteristic features of angiospermic flowers:

(i)Monoecious flower are unisexual,i.e.they have either the male reproductive or female reproductive part in separate flowers, both produced on same plant. The flowers (male and female) are separate. It prevents self-pollination and promotes cross-pollination

(ii)Cleistogamous flowers are those flowers in which anthers and stigmas lie close to each other and do not open at all, even at maturity. These flowers are invariably autogamous and promotes inbreeding depression as there is no chance for cross-pollination at all.

(iii)Self incompatible in angiospermic flowers is a genetic mechanism wherein the flowers prevent the self pollens from fertilising the ovules or inhibits their germination on stigma. This device or mechanism promotes out breeding.

27.(i) Draw a longitudinal section of a pistil of an angiosperm showing the growth of pollen tube up to the micropyle of ovule. Label

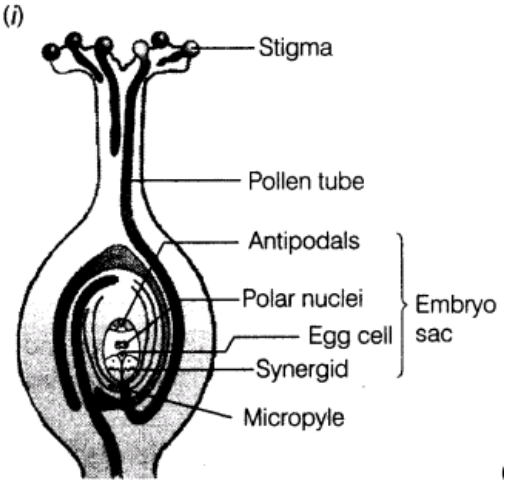
(a)stigma, (b) embryo sac

(c)pollen tube (d) micropyle.

(ii)Explain the events that occurs, upto fertilisation, when the compatible pollen grain lands on the stigma. [Delhi 2014 C]

Ans.

(i)



(ii)The events that occur when compatible pollen grains falls on stigma in the sequence are as follow:

(a)Pollen-pistil interactions Once the compatible pollen grains fall on stigma which is receptive, it recognise and accepts the pollen with the aid of chemical components interacting with pollen.

(b)Germination of pollen grain Once the pollen is recognised, it germinates on the stigma of flower. The tube cell of pollen grain protrudes out through germ pores to form a pollen tube. The generative cell divides to form two male gametes and are released into the tube.

(c)Growth of pollen tube The pollen tube grows down through the tissues of stigma and style and enters ovule, usually through micropyle. Inside ovule, the filiform apparatus guides the pollen tube, carrying gametes to the egg.

(d)Double fertilisation After releasing the two male gametes into the synergids, one of them fuses with egg to form a diploid zygote (syngamy) and other male gamete fuses with 2 polar nuclei to form triploid primary endosperm cell (triple fusion). Because of occurrence of these two types of fusions, it is called double fertilisation.

28.Why is fertilisation in an angiosperm referred to as double fertilisation? Mention the ploidy of the cells involved. [Ml India 2012]

Ans.In fertilisation (in angiosperm), two types of fusion occur, i.e. syngamy and triple fusion, in the embryo sac. That is why it is called double fertilisation.

Ploidy of cells involved in double fertilisation: Zygote is diploid (2n). It is formed as a result of syngamy, i.e. fusion of two haploid gametes (male gamete + egg). Primary endosperm nucleus (3n) is formed as a result of triple fusion, i.e. fusion of two haploid polar nuclei with male gamete

29.(i) Why is the process of fertilisation in angiosperms termed as double fertilisation? Explain.

(ii) Draw a diagram of an angiospermic embryo sac where fertilisation is just completed. Label the following parts

(a)Micropylar end of embryo sac.

(b)The part that develops into an embryo.

(c)The part that develops into an endosperm.

(d)The degenerating cells at the chalazal end.

(iii)Draw a labelled diagram of globular embryonic stage of an angiosperm. [Foreign 2011]

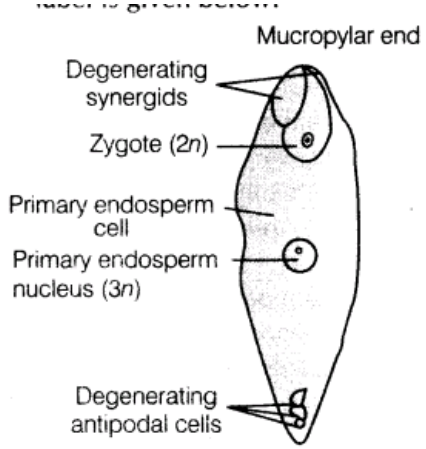
Ans.(i)The phenomenon of double fertilisation occur in following steps:

(a) In an angiospermic plant, two male gametes are discharged by a pollen tube into the embryo sac.

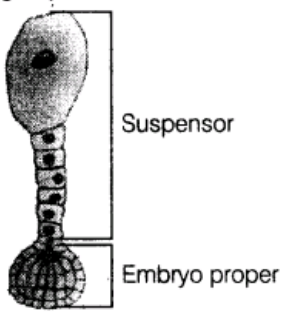
(b) One of the male gametes fuses with the egg to form a zygote. This process is called syngamy.

(c) Other male gamete fuses with the secondary nucleus to form the primary endosperm

nucleus, this process is called triple fusion.
(d) Since, there are two fusions (syngamy and triple fusion), inside an ovule during fertilisation, it is known as double fertilisation.
In fertilisation (in angiosperm), two types of fusion occur, i.e. syngamy and triple fusion, in the embryo sac. That is why it is called double fertilisation.
Ploidy of cells involved in double fertilisation: Zygote is diploid (2n). It is formed as a result of syngamy, i.e. fusion of two haploid gametes (male gamete + egg). Primary endosperm nucleus (3n) is formed as a result of triple fusion, i.e. fusion of two haploid polar nuclei with male gamete
(ii)Fertilised angiospermic embryo sac with label is given below:



(iii) Globular embryonic stage of an angiosperm.



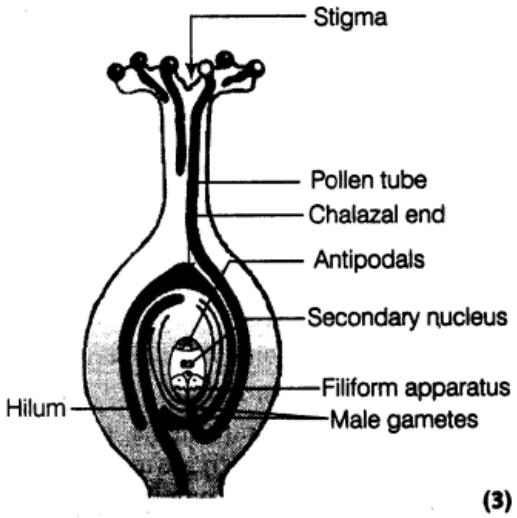
30.(i) Explain the characteristic features of wind pollinated flowers. How are insect pollinated flowers different from them?
(ii) Explain the mutually rewarding relationship between Yucca plant and species of moth.
[Foreign 2011]
Ans.(i) (a) Characteristic features of wind pollinated flowers.
Floral characteristics of a wind pollinated plant are:
(i) Well exposed stamens for the pollen grains to be carried away easily.
(ii) Stigmas are often large and feathery to easily trap the wind-borne pollen grains.
(iii) Flowers normally packed together as an inflorescence.
(iv) Pollen grains are light and non-sticky.
(v)Normally, a single ovule is present in the ovary.
(vi)Non-essential whorls, calyx and corolla are much reduced or absent.
(b) Difference between wind pollinated and insect pollinated flowers.

Wind pollinated	Insect pollinated
These are small.	They are either large or grouped to form large clusters.
Usually inconspicuous due to dull colours.	The presence of bright colours in corolla, calyx or bracts to attract insects.
They are odourless and devoid of nectar.	Strongly odoured and usually possess nectar or edible pollen.
Pollens are produced in large numbers.	Fewer pollen grains are produced.
Examples *Urtica*, Maize, *Parthenium*.	Exmaples Rose, Snapdragon, *Calotropis*.

(ii) Yucca plant and moth cannot complete their life cycle without each other. The moth lays eggs in the locules of the ovary. The larva uses some of the seeds as food. The flower in turn are pollinated by the moth.

31.(i) Geitonogamy is functionally a cross-pollination but genetically similar to autogamy. Explain.
(ii) Why do flowering plants need to develop outbreeding devices? Explain any three such devices developed by flowering plants.[All India 2010 C]
Ans.(i)Transfer of pollen grains from the anther to stigma of another flower of the same plant is called geitonogamy. It is functionally cross-pollination as it involves a pollinating agent but genetically similar to autogamy since, the pollen grains come from the same plant (genetically same parent).
(ii) Continued self-pollination results in inbreeding depression because majority of flowering plants produce hermaphrodite flowers and pollen grains generally come in contact with the stigma of same flower
To discourage this, flowering plants developed many devices. Some of them are Strategies to prevent self-pollination are:
(a)Pollen grain release and stigma receptivity are not synchronised, either the anther matures first or the stigma.
(b)Anther and stigma are placed at different positions, so that the pollens cannot come in contact with the stigma of same flower.
(c)A genetic mechanism called self-incompatibility, which prevents self-pollen from fertilising the ovules either by inhibiting pollen germination or by retarding the growth of pollen tube in the pistil.
(d)By producing unisexual flowers. Plants are dioecious and continued self-pollination may cause inbreeding depression.

32.(i) Draw a labelled diagram of LS of a flower to show the growth of pollen tube reaching egg apparatus.
(ii)Pistil of a flower does not accept pollen from any plant other than its own kind. How does it happen? Explain.
(iii)What is syngamy? [Foreign 2009]
Ans.(i) **Diagram**
Longitudinal Section (LS) of a post-pollinated pistil is given below:



(3)

(ii) Pollen-pistil interaction is mediated by interaction between chemical components secreted by pollen and those of pistil. So if the pollen is not of its kind or compatible to stigma, it does not germinate and the reaction is called pollen-pistil interaction.

(iii) The fusion of a male gamete with a female gamete (egg) to form a zygote is called syngamy.