Mentor Guru

Class 12 – Biology

Chapter 1 – Sexual Reproduction in flowering Plants

Short types question with answer

Q.1. How does a chasmogamous bisexual flower prevent self-pollination?
A.1. A chasmogamous bisexual flower prevents self-pollination in the following ways:

1. **Dichogamy:** In this strategy, the release of pollens and the receptivity of stigma are not synchronized. For eg., in sunflower, the stigma becomes receptive long after the pollen release.
2. **Herkogamy:** In this, the male and female flowers are present at different locations. In this, the pollen of the flower cannot come in contact with the stigma of the same flower. For eg., *Hibiscus gloriosa*
3. **Self-sterility:** It is a mechanism in which the growth of the pollen tube in the pistil or the germination of pollen grains is inhibited. This prevents the fertilization of the ovules from the pollen of the same flower. For eg., Abolition.

Q.2. Arrange them sequentially according to how they appear in the artificial hybridization programme.

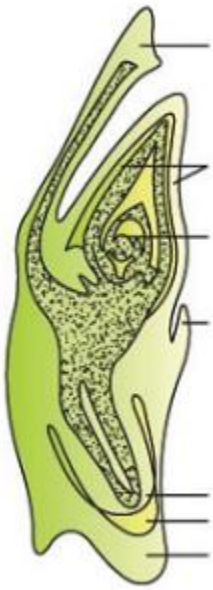
1. **Rebagging**
2. **Selection of parents**
3. **Bagging**
4. **Dusting the pollen on the stigma**
5. **Emasculation**
6. **Collection of pollen**

A.2. a) Selection of parents b) Emasculation c) Bagging d) Collection of pollen e) Dusting of pollen on the stigma f) Rebagging

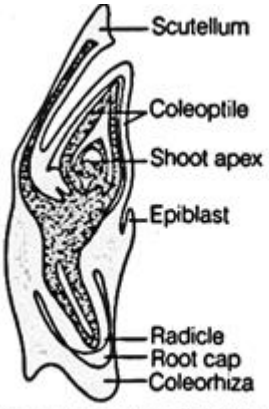
Q.3. How do self-incompatibility restrict autogamy? How does pollination occur in such plants?

A.3. Self-incompatibility restricts autogamy by a mechanism known as self-sterility. This is a genetic mechanism in which the germination of pollen grains or the pollen tube growth in the pistil is inhibited which prevents the pollen from fertilizing the ovules. Such plants pollinate by the process of cross-pollination.

Q.4. Label the following diagram.



A.4.



LS of an manocot embryo of grass

Q.5. Explain the term polyembryony. How is it exploited commercially?

A.5. When more than one embryo occurs in a seed, it is referred to as polyembryony. This can be seen in a few citrus fruits and mango varieties. Polyembryony plays a significant part in plant breeding and horticulture. These embryos give rise to virus-free plantlets and are healthy. Hybrid varieties of such plants and vegetables are being grown extensively. These varieties thus obtained are highly productive.

Q.6. Is there any difference between apomixis and parthenocarpy? Explain the benefits of each.

A.6. Yes, parthenocarpy is different from apomixis. In parthenocarpy, the fruit is produced without the fertilization of the female gamete. It is used for the production of fruits without seeds such as banana and grapes for commercial purposes. Apomixis is the process in which the seeds are produced without fertilization but the process occurs in the female reproductive tract of the plant. In this, the megaspore mother cell does not undergo meiosis. It is used for the commercial production of hybrid varieties and in the production of virus-free varieties.

Q.7. The zygote divides only after the division of the primary endosperm cell. Give reasons in support of the statement.

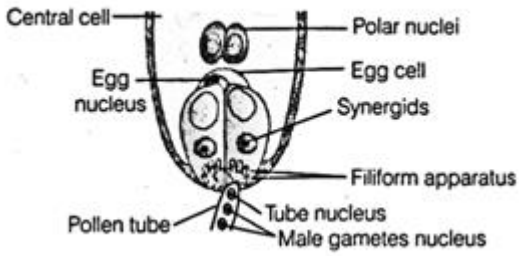
A.7. Zygote requires nourishment for its growth and division. This nourishment is provided by the primary endosperm cell. That is why the zygote divides only after the growth, food storage and division of the primary endosperm cell.

Q.8. Why is it that the generative cell of 2-celled pollen divides in a pollen tube and not of 3-celled pollen?

A.8. The generative cell divides to form two male gametes. In three-celled pollen, the generative cell divides into two gametes, therefore, no further division takes place in the pollen tube. However, in two-celled pollen, the generative cell moves down the pollen tube and divides to form two male gametes.

Q.9. Label the following parts in the diagram given below:
Male gametes, egg cell, polar nuclei, synergid, pollen tube.

A.9.



Q.10.Explain the events which occur after the process of fertilization in plants.

A.10. Fertilization is a vital process, which takes place in all sexually reproducing organisms. In all flowering plants, fertilization occurs after pollination and germination. After the process of fertilization, the following events occur:

1. The ovary becomes the fruit
2. The ovules become the seeds.
3. The other structures including the corolla, calyx, and other remaining parts of the androecium and gynoecium degenerate or fall off.

Long Answer Type Questions

Q.1. Explain the pollination occurring in the chasmogamous flowers.
A.1. The chasmogamous flowers are open with their anther and stigma exposed for pollination. In these flowers two types of pollinations take place:
Self-Pollination: Self-pollination occurs when both the anther and the stigma mature simultaneously and come in contact with each other.
Cross-Pollination: This type of pollination occurs in self-incompatible plants. In this, the anther and the stigma mature at different times so cannot come in contact with each other. Cross-pollination is of two types:

- **Geitonogamy**– When the pollen grains from the anther transfer to the stigma of a different flower in the same plant, it is known as geitonogamy.
- **Xenogamy**– When the pollen grains from the anther of a flower get transferred to the stigma of a flower in some other plant, it is known as xenogamy. This process carries genetically different pollen to the stigma.

Q.2. Describe the structure of the embryo sac of a mature angiosperm. Explain the role of synergids in it.
A.2.

- The cell walls of the 8 nucleate stages are organized in the form of a female gametophyte or embryo sac.
- Six out of the eight nuclei are surrounded by cell walls.
- The egg apparatus comprises two synergids and one egg cell.
- Three cells called the antipodals are present at the chalaza end.
- The central cell is formed by the fusion of two polar nuclei.
- On maturity, the embryo sac of the angiosperms consists of 8 nuclei and 7 cells.
- A single megaspore gives rise to the embryo sac, hence called monosporic embryo sac.

Role of Synergids
The synergids are responsible for the reproduction in an angiosperm. During fertilization, a pollen tube grows into one of the synergids. The tube ceases growth, ruptures and releases two sperm cells.

Q.3. How is it that the embryo sacs of some apomictic species look normal but contain diploid cells?
A.3. The offsprings produced by apomixis are genetically identical to the parent. In flowering plants apomixis is used to reproduce asexually through seeds. In a few species, the diploid egg cell does not undergo reduction division and forms an embryo without fertilization. In a few citrus species, the nucellar cells surrounding the embryo sac divide and give rise to an embryo. This takes place in the megaspore mother cell. It only undergoes mitosis and hence produces diploid cells in the embryo sac.

Q.4. What are the characteristics of wind, water and insect-pollinated flowers?

A.4. Characteristics of wind-pollinated flowers:

- These flowers are not brightly coloured.
- They possess no special odours or nectar.
- They are small and have no petals.
- Their stigma and stamens are exposed to air currents.

- The pollen is smooth, light can be blown easily by wind and are in large numbers.
- The stigma is feathery and can catch pollen from the wind.

Characteristics of water-pollinated flowers:

- They possess small male flowers that are not clearly visible.
- A large number of pollens are released in water that is caught by large, feathery stigma of female flowers.
- This pollen keeps floating on the water surface until they are caught by female flowers.

Characteristics of insect-pollinated flowers:

- They are large with bright-coloured petals to attract insects.
- The flowers have nectar and a pleasant fragrance.
- The pollen grains are sticky and can easily stick to the insect's body.

Q.5. Explain the structure of the pollen.

A.5. Pollen grains are microscopic structures that carry the male reproductive cells of a plant. It is a double-walled structure with a thin inner wall known as endospore composed of cellulose and a thick outer wall known as exospore, composed of sporopollenin.

The exospore protects the male genetic material during transportation from an anther to stigma. The waxes and proteins present on the pollen surface repel moisture and interact with the stigma.

Q.6.What are the functions of a flower?

A.6. The flowers are the reproductive organs of plants and are mainly involved in the reproduction process. The essential functions of flowers are mentioned below:

1. It provides the beauty of the plant.
2. Gametophytes developed in the flowers.
3. Helps in the development of fruit with a seed.
4. Involved in the union of male and female gametes.
5. It accommodates the sex organs of the plant.
6. Flowers provide nectar to certain birds and insects.

7. It protects the reproductive organs of a plant.
8. The flowers can produce diaspores without fertilization.
9. Flowers also promote the union of sperm and eggs from the same flower or different flowers.
10. It helps in pollination by attracting insects and other animals prior to transfer pollen grains.