NCERT Solutions for Class 12 Biology Chapter 2 Sexual Reproduction in Flowering Plants

Q1. Name the parts of an angiosperm flower in which development of male and female gametophyte take place.

Answer:

In an angiosperm plant, development of male gametophyte occurs in the pollen chamber while that of female gametophyte takes place in nucellus.

Q2. Differentiate between microsporogenesis and megasporogenesis. Which type of cell division occurs duringthese events? Name the structures formed atthe end of these two events.

Answer:

Differences between microsporogenesis and megasporogenesis are as follows:

Microsporogenesis	Megasporogenesis
The process of formation of a functional haploid microspore is called microsporogenesis.	The process of formation of a functional haploid microspore is called megasporogenesis.

Microsporogenesis takes place in pollen sac of the anther	Megasporogenesis takes place inside the ovule
Four functional microspores are formed as a result of microsporogenesis	Only one functional megaspore is formed as a result of megasporogenesis, the other three gets degenerated
The four micropores produced as a result of microsporogenesis, are arranged in a tetrad	The four micropores produced as a result of megasporogenesis, are arranged linearly

During microsporogenesis and megasporogenesis, meiosis occurs and results into formation of four microspores and megaspores respectively, Later, mitosis occurs to give rise to microgametophyte and megagametophyte.

At the end of microsporogenesis, four functional haploid microspores are formed whereas at the end of megasporogenesis, four megaspores are formed out of which three degenerates and only one functional megaspore remains.

Q3. Arrange the following terms in the correct developmental sequence: Pollen grain, sporogenous tissue, microspore tetrad, pollen mother cell, male gametes.

Answer:

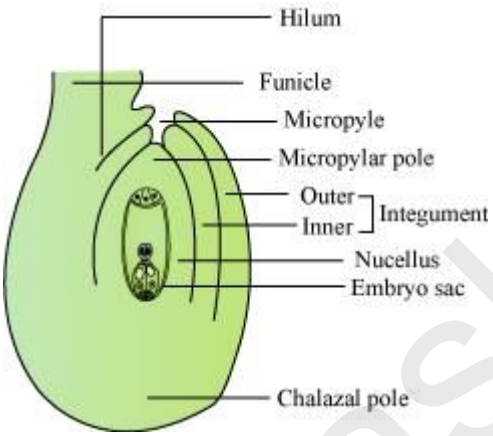
The correct developmental sequence is as follows:

Sporogenous tissue → Pollen mother cell → Microspore tetrad → Pollen grain → male gametes

Q4. With a neat, labelled diagram, describe the parts of a typical angiosperm ovule.

Answer:

The diagram of a typical angiosperm ovule is as follows:



An ovule consists of funicle, micropyle, integuments, nucellus, embryo sac, hilum, chalaza etc.

- **Funicle** - It is the stalk of ovule which connects ovule to the placenta. Funicle is short and multicellular.
- **Hilum** - It is the point where funicle connects the main body of the ovule.
- **Integuments** - These are the layers that surround the ovule. There can be outer integument and inner integument. The main function of integuments is to protect the inner tissues.

- **Micropyle** - The opening which is present at the top of integuments is called micropyle. The main function of micropyle is to allow the entry of the pollen tube into the ovule.
- **Nucellus** - Integuments surround parenchymatous tissue which constitutes the main body of the ovule and is called nucellus. The primary function of nucellus is to provide nutrition to the developing embryo.
- **Chalaza** - The swollen part of ovule present opposite to micropyle is called chalaza.
- **Embryo sac** - It is present in the nucellus and it contains female gamete called egg.

Q5. What is meant by monosporic development of female gametophyte?

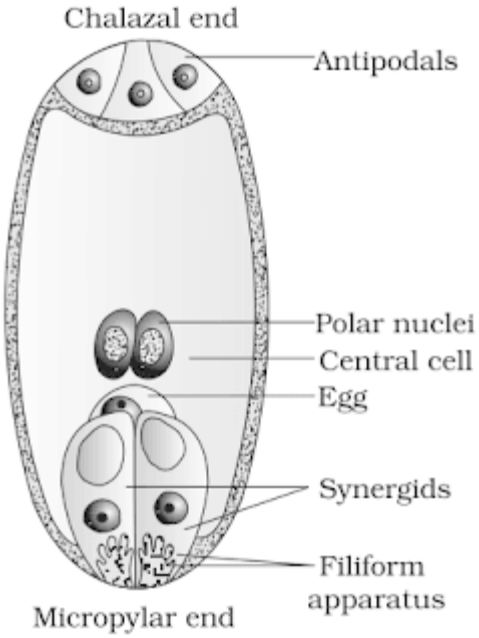
Answer:

The female gametophyte of flowers develops from a single functional megaspore after continuous mitotic divisions. This type of development of female gametophyte from a single uninucleate megaspore is called monosporic development of female gametophyte.

Q6. With a neat diagram explain the 7-celled, 8-nucleate nature of the female gametophyte.

Answer:

The diagram of 7- celled 8- nucleate embryo sac of plants is as follows:



The female gametophyte of plants is formed from a single functional megaspore with the help of four unequal mitotic divisions. These mitotic divisions give rise to 8 nuclei. Later, these nuclei assemble into 7 cells. To both chalazal and micropylar end three cells each move. The three cells at chalaza are called antipodal cells while those at micropylar end constitute egg apparatus. The egg apparatus includes two larger cells called synergid while the egg is the smallest cell that acts as a female gamete.

Two nuclei migrate to the centre and together they form a single cell called the central cell. This central cell consists of two nuclei called polar nuclei. Thus, the mature embryo sac possesses 7 cells (3 antipodal cells, 2 synergid cells, 1 egg cell and 1 central cell) and 8 nuclei (3 of antipodal cell, 2 of synergid cells, 1 of egg cell and 2 of central cell).

Q7. What are chasmogamous flowers? Can cross-pollination occur in cleistogamous flowers? Give reasons for your answer.

Answer:

Flowers can be of two types i.e. chasmogamous flowers or cleistogamous flowers. Chasmogamous flowers are open flowers which have their anthers and stigma exposed. These flowers facilitate cross-pollination. On the other hand, cleistogamous flowers are closed flowers whose anthers and stigmas are not exposed. Since these flowers do not open at all, only self-pollination occurs in these and cross-pollination is never seen. Thus. cross-pollination cannot occur in cleistogamous flowers.

NCERT solutions for class 12 biology chapter 2 sexual reproduction in flowering plants:

Q8. Mention two strategies evolved to prevent self-pollination in flowers.

Answer:

Self-pollination refers to the transfer of pollen grains from the anther of a flower to the stigma of the same flower. Continuous self-pollination can reduce the variations in the progeny and cause a reduction in the vigour and vitality. Thus, plants have developed certain mechanisms to avoid self-pollination and ensure cross-pollination. The two of these mechanisms to prevent self-pollination are as follows:

1. Self sterility or self-incompatibility - In this mechanism, the pollen grains of a flower do not germinate on the stigma of the same flower. This occurs due to the presence of some self-sterile genes. This mechanism is genetic.
2. Dichogamy- In this method, the timing of maturation of anthers and stigmas of a bisexual flower is different so as to prevent self-pollination.

Protandry- Anthers mature earlier than the stigma of the same flower. So, even if the pollens fall on these stigmas, they are unable to germinate. E.g. sunflower, *Salvia.*

Protogyny- Stigmas mature earlier than anthers and get pollinated by mature pollen grains of other flowers. E.g. *Mirabilis jalapa.*

Q9. What is self-incompatibility? Why does self-pollination not lead to seed formation in self-incompatible species?

Answer:

Self-incompatibility refers to the genetic inability of fully functional pollen grains and ovules to produce viable seeds. This is mainly due to the presence of S or self genes. If these genes are present in pollen as well as ovule, they will not be able to produce viable seeds. Self-pollination does not lead to the formation of seeds in self-incompatible species due to the presence of certain chemical substances that block the germination of pollen grains on stigma and also obstruct their passage to the ovary.

Q10. What is bagging technique? How is it useful in a plant breeding programme?

Answer:

Bagging technique - Bagging refers to covering of emasculated flowers with the help of butter paper or plastic bags to avoid contamination of stigma of these flowers to undesired pollens.

This technique is used during artificial hybridisation experiments. This technique is useful in breeding programmes because it prevents contamination of stigma with unwanted pollens. So, through this technique, we can allow the breeding of species according to our need and obtain superior species.

Q11. What is triple fusion? Where and how does it take place? Name the nuclei involved in triple fusion.

Answer:

A pollen grain produces two male gametes. Out of these, one male gamete fuses with the egg cell and produces a zygote. The second male gamete fuses with the two polar nuclei of the central cell to produce primary endosperm nucleus. Since this fusion includes three haploid nuclei, it is called triple fusion.

The process of triple fusion occurs in the central cell of embryo sac. The pollen tube delivers one nucleus to the egg cell while the other one migrates to centre and fuses polar nuclei.

In triple fusion, two polar nuclei and one male gamete are involved.

Q12. Why do you think the zygote is dormant for sometime in a fertilised ovule?

Answer:

The zygote starts developing into an embryo only when a certain amount of endosperm has developed. This is because endosperm provides nourishment to the developing embryo. Thus, a zygote remains dormant in a fertilised ovule till the endosperm has developed.

Q13(a). Differentiate between:

(a) hypocotyl and epicotyl

Answer:

The differences between hypocotyl and epicotyl are as follows:

Hypocotyl	Epicotyl
This is the portion of the embryo present below the cotyledon.	This is the portion of embryo present above the cotyledon.
Hypocotyl ends into radicle	Epicotyl ends into plumule

Q13(b) . Differentiate between:

(b) coleoptile and coleorrhiza

Answer:

The differences between coleoptile and coleorrhiza are as follows:

Coleoptile	Coleorrhiza
Coleoptile refers to the protective covering that surrounds plumule	Coleorrhiza is the sheath that surrounds the radicle and root cap

This sheath can come out of the soil, become green and perform photosynthesis.	Coleorrhiza remains in the soil only.

Q13(c) . Differentiate between:

(c) integument and testa

Answer:

The differences between integument and testa are as follows:

Integument	Testa
It is a pre fertilisation structure that covers the ovule	It is a post-fertilisation structure that covers the seed
The integument is a thin layer consisting of living cells	Testa is a thick coat consisting of dead cells
The integument arises from chalaza	Testa is derived from the integuments

Q13(d). Differentiate between:

(d) perisperm and pericar

Answer:

The differences between perisperm and pericarp are as follows:

Perisperm	Pericarp
Perisperm refers to the residual persistent nucellus	The pericarp is the wall of fruit derived from the ovary wall
Perisperm is non-functional to the seed	The function of the pericarp is the protection of inside structures
It is dry	It is fleshy.

Q14. Why is apple called a false fruit? Which part(s) of the flower forms the fruit?

Answer:

The fruits are formed from the ovary of a flower after fertilisation. Such fruits that develop from the ovary are called true fruits. On the other hand, fruits formed from any part of the flower other than ovary are called false fruits. Apple is called a false fruit because it develops from the thalamus and not from the ovary.

The parts of flower that take part in fruit formation are ovary, thalamus etc.

Q15. What is meant by emasculation? When and why does a plant breeder employ this technique?

Answer:

The process of removal of anthers from the flower with the help of forceps without affecting the female reproductive parts is called emasculation. This technique is used by plant breeders to allow suggestive breeding between plants in order to produce plants with desired seeds. Hence, it can be used to prevent self-pollination or prevent cross-pollination according to the need of the breeder.

Q16. If one can induce parthenocarpy through the application of growth substances, which fruits would you select to induce parthenocarpy and why?

Answer:

The fruits formed as a result of parthenocarpy are generally seedless. Hence, for parthenocarpy, we can select fruits which have a lot of seeds in them. Such fruits include watermelon, orange, muskmelon, lemon etc. So we can select watermelon to induce parthenocarpy because by this method we can have seedless watermelons.

Q17. Explain the role of tapetum in the formation ofpollen-grain wall.

Answer:

Tapetum is the nutritive innermost layer of microsporangium that provides nutrition to the developing microspores. The role of tapetum in the formation of pollen grain wall is as follows:

- Tapetum secretes ubisch granules required for the formation of sporopollenin in the exine (outer wall) of pollen grain
- Tapetum also secretes pollenkit substances required for the formation of pollen grain wall