



9. Differentiate between the following:

1. Red algae and brown algae
2. Homosporous and heterosporous pteridophytes
3. Liverworts and moss
4. Syngamy and triple fusion.

Solution: (i) The differences between red algae and brown algae are as follows :

	Red algae	Brown algae
(i)	The major pigment of red algae are chlorophyll <i>a, d</i> and phycoerythrin.	The major pigment of brown algae are chlorophyll <i>a, c</i> , and fucoxanthin.
(ii)	In red algae, floridean starch is the stored food material.	In brown algae, mannitol and laminarin are the stored food materials.
(iii)	In red algae cellulose is present in cell wall.	In brown algae cellulose and algin are present in cell wall.
(iv)	Flagella are absent.	The number of flagella is 2, they are unequal in size and lateral in position.
(v)	Thylakoids are unstaked.	Thylakoids occur in groups of three.

(ii) The differences between homosporous and heterosporous pteridophytes are as follows:

	Homosporous pteridophytes	Heterosporous pteridophytes
(i)	In these pteridophytes only one kind of spore is produced.	In these pteridophytes two kinds of spores are produced.
(ii)	The spores are equal in size.	The smaller spores are called microspores and the larger spores are called megaspores.
(iii)	The spores are produced from the same sporangia.	The microspores are produced from the microsporangia and the megaspores are produced from the megasporangia.
(iv)	The spores develop one kind of gametophyte.	The microspore develops into male gametophyte whereas the megaspore develops into female gametophyte.
(v)	Spores germinate in soil and produce independent gametophyte.	Spores germinate within sporangia and produce dependent gametophyte.
(vi)	<i>e.g., Lycopodium</i>	<i>e.g., Selaginella, Salvinia.</i>

(iii) The differences between liverworts and mosses are as follows :

	Liverworts	Mosses
(i)	The gametophytic plant body may be thallose (<i>e.g., Riccia</i>) or foliose.	Gametophytic plant body is differentiated into prostrate, branched filamentous, thalloid protonema and leafy erect gametophore.
(ii)	On the ventral surface of the thallus unicellular rhizoids and simple multicellular scales are present.	The rhizoids are multicellular, branched with oblique septa.
(iii)	Sex organs are present on dorsal surface of the thallus and develop from superficial cells.	The sex organs develop from the superficial cells at the apex of leafy gametophyte.
(iv)	Elaters are generally present but absent in <i>Riccia</i> .	Elaters are absent.
(v)	Stomata are absent in the wall of the capsule.	Stomata are present in sporophyte for gaseous exchange.
(vi)	Dehiscence of capsule is irregular.	Dehiscence is regular.

(iv) The differences between syngamy and triple fusion are as follows :

	Syngamy	Triple fusion
(i)	It is the generative fertilisation.	It is vegetative fertilisation.
(ii)	Both male and female gametes are involved in syngamy.	Only one male gamete and two vegetative nuclei are involved in triple fusion.
(iii)	Syngamy produces a diploid zygote.	It produces a triploid primary endosperm cell.
(iv)	Zygote forms the embryo.	Primary endosperm cell produces a food laden endosperm.

10. How would you distinguish monocots from dicots?

Solution: Differences between monocots and dicots are as follows :

	Monocots	Dicots
(i)	The seeds contain one cotyledon.	The seeds contain two cotyledons.
(ii)	Flowers are generally trimerous.	Flowers are generally pentamerous or tetramerous.
(iii)	Pollen grains generally possess a single germ pore.	Pollen grains commonly have three germ pores.
(iv)	Leaves generally possess parallel venation.	Leaves possess reticulate venation.
(v)	Primary root is short lived. Tap root is absent. Adventitious roots present.	Primary root is long lived and it forms tap root. Adventitious roots are found in some cases.
(vi)	In stems, ground tissue is not differentiated into cortex and pith.	In stems, ground tissue is differentiated into cortex, pith, endodermis etc.
(vii)	Vascular bundles are scattered and closed. Cambium absent.	Vascular bundles are arranged in a ring and open. Cambium present.
(viii)	In root, a pith is always present. Vascular bundles are many (more than 8).	In root, pith is absent. Vascular bundles are few.
(ix)	Vessels are rounded in outline.	Vessels are polygonal in outline.

11. Match the following (Column I with Column II).

Column I	Column II
(a) Chlamydomonas	(i) Moss
(b) Cycas	(ii) Pteridophyte
(c) Selaginella	(iii) Algae
(d) Sphagnum	(iv) Gymnosperm

Solution:

Column I	Column II
(a) Chlamydomonas	(iii) Algae
(b) Cycas	(iv) Gymnosperm
(c) Selaginella	(ii) Pteridophyte
(d) Sphagnum	(i) Moss

12. Describe the important characteristics of gymnosperms.

Solution:

The term gymnosperm is derived from two Greek words: Gymnos = naked + Sperma = seed, i.e., naked seeded plants. So gymnosperms are a group of plants in which the ovules are freely exposed on open megasporophylls. The important characteristics of gymnosperms are :

1. Living gymnosperms are perennial and vary from predominantly medium - sized trees (Cycas) to tall trees (Pinus) and shrubs (Ephedra).
2. Plants possess tap root system. Some genera possess symbiotic relationship of N₂ fixing algae in coralloid roots (Cycas) and fungi in mycorrhizal roots (Pinus).
3. The stems are aerial, erect, branched (unbranched in Cycas) and woody.
4. The leaves may be simple or compound. They are scaly and foliage also. Leaves are well adapted to withstand extremes of temperature, humidity and wind.
5. Roots are characterised by the presence of diarch to polyarch vascular bundles. Xylem is exarch.
6. Stems are provided with collateral, endarch and open vascular bundles which are arranged in a ring. Secondary growth is present and annual rings are formed.
7. Xylem contains xylem parenchyma and tracheids with bordered pits and vessels are absent (except in Gnetum; Ephedra and Weluhtschia).
8. Phloem contains sieve cells and phloem parenchyma and companion cells are absent (except in Gnetum; Ephedra and Weluhtschia).
9. Leaves are protected by thick layers of cuticle. Sunken stomata are present. Mesarch xylem and transfusion tissues are found in the leaves. Palisade tissue and spongy parenchyma may be present in mesophyll or it may be undifferentiated.
10. The reproductive organs form cones or strobilus except female organs of Cycas.
11. The male cone is made of overlapping microsporophylls, that bear microsporangia on the abaxial side which produce microspores.
12. Female cone is formed by overlapping megasporophylls which bear ovules (megasporangia).
13. Ovule is orthotropous, unitegmic with 3 layers i.e. outer fleshy, middle stony and inner fleshy.
14. The nucellus of ovule contains single megaspore mother cell which undergoes reduction division to form 4 megaspores, out of which 3 degenerate and only one survives.
15. So gymnosperm is heterosporous i.e. producing microspores and megaspores.
16. Single megaspore forms haploid female gametophyte or endosperm before fertilisation.
17. At micropylar end of female gametophyte 2 or more archegonia are produced. Archegonium is with reduced neck (with no neck canal cell).
18. Microspores are released from microsporangium and are carried in air currents and come in contact with the micropyle of the ovules.
19. Pollen tube carrying the male gametes grows towards archegonia and discharges its contents near the mouth of the archegonia.
20. After fertilisation zygote or oospore gives rise to embryo proper and the ovules develop into seeds.
21. Polyembryony i.e., development of more than one embryo is an usual feature of gymnosperms but only one of them survives at later stage.
22. In embryo 2 or many cotyledons are present. The seeds of gymnosperms are uncovered.

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