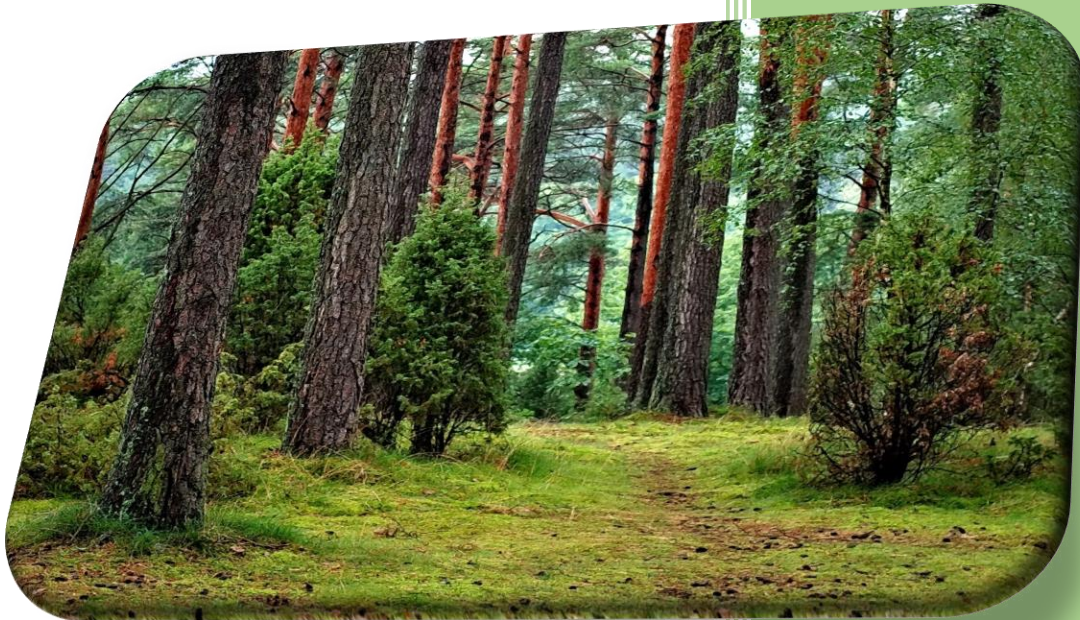


**ATOMIC ENERGY CENTRAL SCHOOL,  
INDORE**

**BIOLOGY- STANDARD XI**

# MODULE 3.3



**UNIT 1 :**  
**DIVERSITY IN THE LIVING WORLD**  
**CHAPTER 3 :**  
**PLANT KINGDOM**

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## Gymnosperms

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- ✚ The gymnosperms (Gymnos = naked; sperma = seeds) are plants in which the ovules are not enclosed by any ovary wall and remain exposed, both before and after fertilisation.
- ✚ Unlike bryophytes and pteridophytes, in gymnosperms the male and the female gametophytes do not have an independent free-living existence.
- ✚ They remain within the sporangia retained on the sporophytes. These plants are mostly found in colder parts of northern hemisphere, where they form extensive forests.
- ✚ A number of gymnosperms are now, known as ornamentals, e.g., Ginkgo, Thuja, Araucaria, etc.

### **Morphology**

- ✚ Gymnosperms include, medium-sized trees or tall trees and shrubs. The giant red wood tree Sequoia. Species of Gnetum are woody climbers. The smallest gymnosperm is Zamia pygmaea.
- ✚ Roots in some genera have fungal association in the form of mycorrhiza {Pinus), while in some others {Cycas) small specialised roots called coralloid
- ✚ Roots are associated with N<sub>2</sub>-fixing cyanobacteria such as Anabaena, Nostoc.
- ✚ The stems are branched {Pinus, Cedrus) or unbranched {Cycas).
- ✚ The leaves may be simple or compound.
- ✚ The megaspore mother cell is enclosed within the megasporangium (nucellus) and develops into a multicellular female gametophyte, bearing two or more archegonia of female sex organs.
- ✚ The multicellular female gametophyte is also retained within megasporangium.
- ✚ The male gametes are carried to the archegonia, i.e., gamete in the ovule by means of a tube called pollen tube and discharge their contents near the mouth of the archegonia. This is called siphonogamy. Following fertilisation, zygote develops into an embryo and the ovules into seeds.
- ✚ The seeds contain food laden tissue called endosperm.
- ✚ It lies naked or exposed.
- ✚ Endosperm provides nourishment for growth of seedling at the time of seed germination.  
Examples Cycas, Pinus, Ginkgo, Ephedra, Gnetum, Vaucheria, Cedrus, Abies, etc.

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## Angiosperms

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- ✚ Angiosperms are seed bearing plants or flowering plants.
- ✚ Unlike gymnosperms where the ovules are naked.
- ✚ In angiosperms the sporophyll are organised into flowers and the seeds are produced inside fruits.
- ✚ Zostera is a marine angiosperm.
- ✚ These plant are sporophytic, in the form of herbs, shrubs, trees, climber creepers, etc.
- ✚ The smallest angiosperm is water plant Wolffia and tallest is Eucalyptus regnans.
- ✚ Primary root develops from radicle. It forms tap root system.
- ✚ In many angiosperms roots develop from places other than radicle, these are adventitious roots.
- ✚ Stem develops from plumule.
- ✚ These are simple or compound. The leaves bear axillary buds which can grow into stem branches.
- ✚ Angiosperms have vessels in xylem. Phloem contains sieve tubes and companion cells in regard to gymnosperms which do not have companion cells.
- ✚ Flowers are the reproductive structures formed by the union of one or both types of sporophylls (microsporophylls or stamens and megasporophylls or carpels).
- ✚ Stamens are considered as the male sex organs of a flower. An anther contains four microsporangia, each developing into a pollen grain. Carpel or pistil is called the female sex organ of the flower.
- ✚ A megaspore mother cell is differentiated in the nucellus and undergoes meiosis, ultimately one functional megaspore gets enlarged and forms the female gametophyte known as embryo-sac.  
**Each cell of an embryo sac is haploid.**
- ✚ Fertilisation and Development of a Seed: Each pollen grain germinates on the stigma forming a pollen tube that carries two male gametes to the embryo sac, growing through the tissues of stigma and style.
- ✚ **Alteration of Generation**  
Different plant groups and individual have different features in their life cycle.

### **Haplontic**

The dominant photosynthetic phase is a gametophyte produced by haploid spores. Meiosis in the zygote results in formation of haploid spores.

### **Diplontic**

In this type, the diploid sporophyte is the dominant. The multicellular diploid phase is called sporophyte. The gametophytic phase is represented by the single to few celled haploid gametophyte.

### **Haplodiplontic**

In this type, there are two distinct multicellular phases, diploid sporophyte and haploid gametophyte are present. Both phases are multicellular.

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## **References**

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