Characteristics of Gymnosperms

Gymnosperms are, those seed plants in which the seeds remain exposed over the surface of the megasporophylls because the latter are not folded to form pistils.

1. Gymnosperms are a small group of seed plants which are represented by only 900 living species. Gymnosperms are more ancient than the angiosperms. They formed dominant vegetation on earth some 200 million years back in mesozoic era. Today they are dominant only in cold areas, where instead of rain; snow is the source of water.

2. At other places they have been replaced by angiosperms. In warmer areas only a handful of gymnosperms can be observed, e.g., *Cycas* (like *C. circinalis* in South India), *Araucaria* (native of South America, New Zealand and East Australia, like *A. heterophylla*.

3. All gymnosperms are perennial and woody, forming either bushes or trees. Some of these are very large and live for thousands of years, e.g., *Sequoia sempervirens* (tallest gymnosperm of 111.6 m) *Zamia pygmia* is smallest (26 cm).

4. Flowers are absent. Two types of sporophylls, microsporophyll's and megasporophylls are usually aggregated to form distinct cones or strobili, pollen cones (male cones) and seed cones (female cones) respectively.

5. Seeds do not occur inside a fruit. They are naked.

6. A distinction of ovary, style and stigma is absent.

7. Ovules are orthotropous and sessile. Each ovule is surrounded by a 3-layered integument.

8. Female gametophyte contains archegonia.

9. Pollination is direct as a stigma is absent and the pollen grains directly reach the micropylar ends of ovules. Pollination is usually accomplished by wind (anemophily).

10. Male gametophyte produces only two male gametes or sperms. Generally, one of them is functional.

11. An external water is not required for transport of male gametes. Instead, a pollen tube is formed by the male gametophyte for effecting fertilization (siphonogamy).

12. Seeds contain a food laden tissue or endosperm for future growth of embryo into seedling. The tissue represents the female gametophyte.

13. Like pteridophytes, xylem does not possess vessels except in some geophytes. Phloem is without companion cells and sieve tubes. Sieve cells are not arranged end to end in rows

14. Vascular tissues are arranged into vascular bundles just like angiosperms. Vascular bundles of stem are open so that secondary growth is quite common.

Economic importance of Gymnosperms

As food

- Seeds of some species are edible: *Cycas*, *Ginko*, *Pinus*, *Gnetum*
- The seeds and stems of *Cycas* yield ‘sago’ which is a starch and is also called “arrow root”.
- *Zamia* is a rich source of starch.

- Seeds and stem of *Cycas revoluta* used for making wine.
- Young leaves of *Cycas* cooked as vegetables. kaffir bread' prepared from the stem pith of Encephalartos.

As medicine

- Ephedrine (alkaloid) extracted from *Ephedra* used in treating asthma, cough, cold, bronchitis etc.
- Tincture of *Ephedra* is a cardiac stimulant.
- Anti-cancerous drug called taxol, is obtained from the bark of Taxus.
- The juice is extracted from young leaves of *Cycas revoluta* is used for curing blood vomiting and flatulence.
- In Assam the pounded stem of *Cycas pectinata* is used as a hair wash for diseased hair roots.

As ornaments

- Species of Cycas are used for decoration purposes.
- *Ginkgo bioloba* possess beautiful ornamental leaves.
- *Thuja*, *Pinus*, *Taxus* etc are grown in parks.

In Industry

- Gum- Cycas gum used as adhesive, antidote for snake bites and using malignant ulcers.
- Tannins- Tannins are used in leather industry and it is extracted from the bark of *Araucaria*, *Sequoia* etc.
- Canada balsam- it is turpentine obtained from *Abies balsamea* and used as a mounting medium in biological preparations.

- Amber- it is a fossil resin obtained from *Pinus succinifera*. Wood of Pinus is used for doors, poles, beams, railway wagon flooring etc.
- Plywood is prepared from *Podocarpus*.
- Papers like newsprints, writing and printing.
- Tannins are prepared from the bark of *Araucaria* and *Sequoia*.
- The leaves of Cycads are used for preparing baskets, mats, hats, brooms etc.
- The fibers obtained from the leaves of *Cycas* and *Macrozamia* are used for stuffing pillows and making mattresses.
- Source of oils *Oil extracted from seeds of *C. revoluta*, *Macrozamia*, *Pinus cembra* and *Cephalotaxus drupacea* are used as edible oils. *Red cedar wood oil extracted from the heart wood of *Juniperus virgiana* is used for cleaning microscopic preparations and for oil immersion lenses. *Oils obtained from *Cedrus deodara*, *Ciyptomeria japonica* and *Cupressusserm perivirens* are used in preparations of perfumes.

References

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