

B.Sc. Botany (Sub.) I_ Group: A**Gymnosperms: Classification and Economic Importance**

Until 1827, the gymnosperms were not recognized as a separate group from the angiosperms. The members included in the gymnosperm today were considered as a member of angiosperms. The ovules of Cycads and conifers were regarded as female flowers.

In 1827, Robert Brown showed that the so called female flowers were actually ovules and the gymnosperms could be recognized as a group separate from angiosperms.

Bentham and Hooker 1862-63, treated the gymnosperms parallel to the dicotyledons and monocotyledons and placed the gymnosperm in between them. Only three groups of gymnosperms were recognized by them- Cycadaceae, Coniferae and Gnetales.

A new group Ginkgoales is created by Engler (1897) to include Ginkgo and its fossil members.

Van Tieghem (1898) removed the gymnosperms from the intermediate position and treated the gymnosperms as one of the division of Spermatophyta. Spermatophyta divided into Astigmatic Gymnosperm and Stigmatic Angiosperm.

As the information regarding the various fossil members was accumulated three more groups were established in the beginning of the current century. Pteridospermales, Bennettiales and Cordaitales.

Thus in all seven groups were established.

Coulter and Chamberlain (1917) divided the gymnosperms into seven orders-

- i. Pteridospermales
- ii. Bennettiales
- iii. Cycadales
- iv. Cordaitales
- v. Coniferales
- vi. Ginkgoales and
- vii. Gnetales



Chamberlain (1934) divided the gymnosperms into two classes-

- i. Cycadophyta
- ii. Coniferophyta

The characteristics features of Cycadophyta-

- i. Plants- Plants are comparatively smaller in size.
- ii. Stem- Usually unbranched.
- iii. Leaves- Usually pinnate, compound.
- iv. Sporophyll- usually organized into simple cones.
- v. In T.S. - Stem shows broad cortex manoxylic wood and broad pith.

The characteristics features of Coniferophyta-

- i. Plants- Plants are comparatively larger in size.
- ii. Stem- Stems usually much branched.
- iii. Leaves- Leaves usually simple.
- iv. Sporophyll- Sporophylls organized into simple and compound.
- v. In T.S. - Stem shows narrow cortex pycnoxylic wood and small pith.

The class Cycadophyta is divided into three orders-

- i. Pteridospermales
- ii. Bennettitales
- iii. Cycadodales

The class Coniferophyta is divided into four orders-

- i. Cordaitales
- ii. Coniferales
- iii. Ginkgoales
- iv. Gnetales

K.R. Sporne (1965) divided the gymnosperms into three classes-

- i. Cycadopsida
- ii. Coniferopsida
- iii. Gnetopsida

The characteristics features of Cycadopsida-

- i. Wood- manoxylic, vessels absent
- ii. Leaves- Pinnate compound
- iii. Seed- With radial symmetry



The characteristics features of Coniferopsida-

- i. Wood- Pycnoxylic, vessels absent
- ii. Leaves- simple
- iii. Seeds- Bilateral symmetry

The Characteristics features of Gnetopsida-

- i. Wood- Simple
- ii. Seed- Radical symmetry

The class Cycadopsida divided into four orders-

- i. Pteridospermales
- ii. Bennettitales
- iii. Pentoxylales
- iv. Cycadales

The class Coniferopsida divided into four orders-

- i. Cordaitales
- ii. Coniferales
- iii. Ginkgoales
- iv. Taxales

The class Gnetopsida, a single order -

- i. Gnetales.

Economic Importance of Gymnosperms:

Ornamental:

A number of gymnosperms are grown as ornamental plants, e.g., *Cycas*, *Araucaria*, *Thuja* etc.

Food :

- i. 'Sago' starch obtained from pith and cortex of stem of *C. revolute*, *C. rumphi* etc.
- ii. 'Seed starch' obtained from seeds of *Cycas rumphii*, *Dioon edule* etc. It is prepared into flour and cooked before eating.
- iii. Seeds of *Pinus gerardiana* (chilgoza) are edible.
- iv. 'Kaffir bread' prepared from the stem pith of *Encephalartos*.



v. Young leaves of *Cycas* cooked as vegetables.

Medicinal:

i. Ephedrine (alkaloid) extracted from *Ephedra* used in treating asthma, cough, cold, bronchitis etc. Tincture of *Ephedra* is a cardiac stimulant.

ii. The juice extracted from young leaves of *Cycas revoluta* is used for curing blood vomiting and flatulence.

Industrial:

i. Gum-Cycas gum used as adhesive, antidote for snake bites and using malignant ulcers.

ii. Tannins – Tannins extracted from bark of *Araucaria*, *Pinus*, *Sequoia* etc. used in leather industry.

iii. Canada balsam – It is turpentine obtained from *Abies balsamea* and used as a mounting medium in biological preparations.

iv. Amber (fossil resin) – obtained from *Pinus succinifera*. Wood of *Pinus* is used for doors, poles, beams, railway wagon flooring etc.

v. Papers like newsprints, writing and printing papers are being prepared from the wood pulp of *Pinus*, *Picea*, *Abies*, *Gnetum* etc.

vi. The leaves of cycads are used for preparing baskets, mats, hats, brooms etc.

vii. The fibres obtained from the leaves of *Cycas* are used for stuffing pillows and making mattresses.

Source of oils:

i. Oils extracted from seeds of *C. revoluta*, *Pinus cembra* and *Cephalotaxus drupacea* are used as edible oils.

ii. Red cedar wood oil extracted from the heart wood of *Juniperus virginiana* is used for cleaning microscopic preparations and for oil immersion lenses.

ii. Oils obtained from *Cedrus deodara* is used in preparations of perfumes.

