


**1-GENERAL
CHARACTERISTICS OF
GYMNOSPERMS,
DISSECTION OF MALE
AND FEMALE CONES IN
GYMNOSPERMS**



1. General Information

The **gymnosperm** and **angiosperms** together compose the **spermatophytes** or seed plants.

The **gymnosperms** are a group of **seed-producing plants** that includes **Coniferophyta**, **Cycadophyta**, **Ginkgophyta**, and **Gnetophyta**.

The term "gymnosperm" comes from the **Greek** composite word (**gymnos**, "naked" and **sperma** "seed"), meaning "naked seeds". In Gymnosperms, in maturity, cone scales open and seeds become visible. But, in Angiosperm, the seeds are invisible because the seed is covered with carpels.

There are more than **1000** extant or currently living species of Gymnosperms in **88 plant genera** belonging to **14 plant families** in world.

There are **37 taxa** of Gymnosperms in **8 plant genera** belonging to **4 plant families** in Turkey.

1. Ephedraceae:

Ephedra

2. Cupressaceae:

Cupressus, Juniperus

3. Pinaceae:

Abies, Cedrus, Picea, Pinus

4. Taxaceae:

Taxus

WHAT IS THE DIFFERENCES BETWEEN GYMNOSPERMS AND ANGIOSPERMS

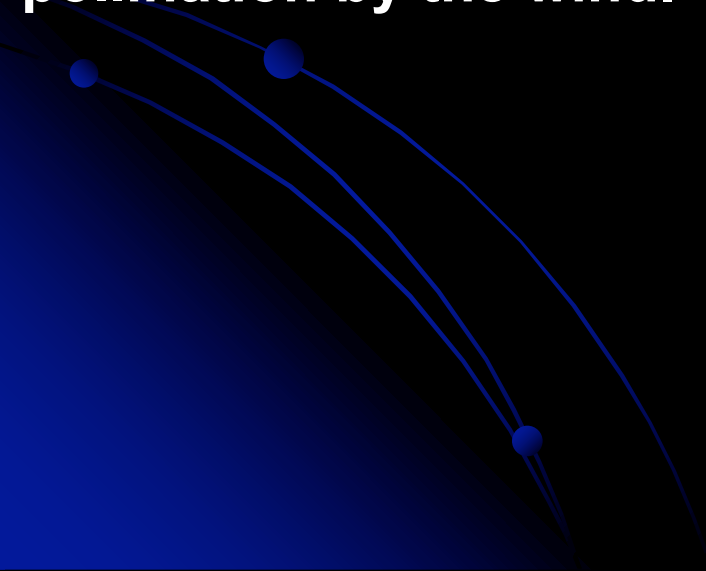
No	Gymnosperms	Angiosperms
1	In gymnosperms the reproductive structures are cones which are unisexual	In angiosperms, the flowers are the reproductive organs and they may be both unisexual and bisexual
2	The ovules are exposed	The ovules are enclosed in the ovary
3	After fertilization, the ovules develop into naked seeds	After fertilization, the ovules develop into seeds inside the fruit
4	The microspores and megaspores are produced by male and female cones	The microspores are produced in anthers while the megaspores are produced in ovules of the ovary in flower

5	The pollen grains fall and germinate directly on the micropyle of the ovules	The pollen grains fall on the stigma, germinate and the pollen tube carries the male gamete to the ovary
6	Fertilization is simple	Fertilization is double
7	Endosperm is haploid (n)	Endosperm is triploid (3n)
8	In gymnosperms the pollination is by wind alone	In angiosperms, different agents like wind, insects, bats are involved in pollination
9	In gymnosperms, generally the xylem contains only tracheids. Trache (vessels) is absent.	Angiosperms vessels are always present
10	The phloem has no companion cells	Companion cells are present

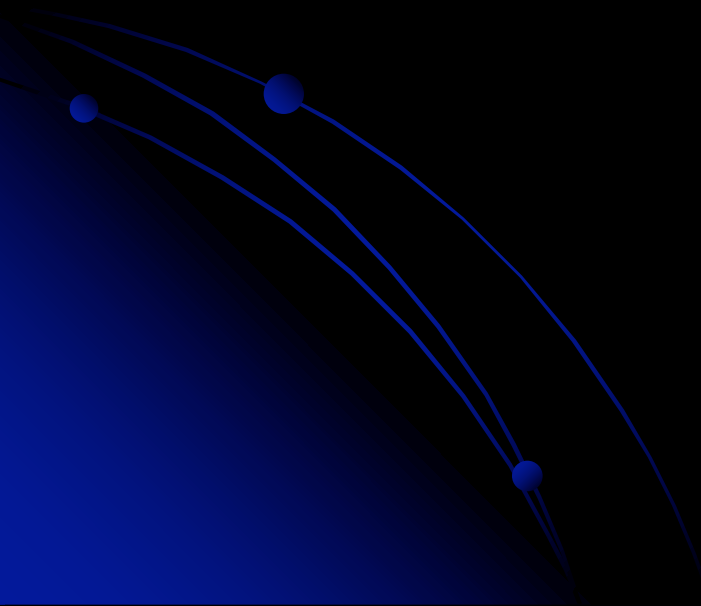
2-The Cone Structure of Gymnosperms

Gymnosperms have cone structure instead of flower structure.

A-Male Cones are composed of a large number of scaly-like microsporophylls on a long axis. At the underside of the microsporophylls **2** or **4** microsporangia develops. Then, pollen formation occurs as a result of meiosis. In the last stage, microsporangia are opened and pollen grains are dispersed to pollination by the wind.



B-Female cones are composed of macrosporophylls spirally arranged on an axis. At the top of each macrosporophyll is found 2 seeds. It is generally made up of small, thin and brown colored bractes and carpels. In cone structure of some species, the bractes exerted outward.



PINACEAE FAMILY

Genus: ABIES

Female Cone



Male cone



Genus: CEDRUS

Female cone



Male cone



Genus: PINUS

Female cone



Male cones



CUPRESSACEAE

Genus: CUPRESSUS

Female cones



Male Cone



TAXACEAE

Genus: TAXUS

Female cones



Male cones



EPHEDRACEAE

Genus: EPHEDRA

Female cones



Male cones



Thanks...

