**PHYLUM SPERMATOPHYTA**

The spermatophytes, comprises of [plants](https://en.wikipedia.org/wiki/Plant) that produce [seeds](https://en.wikipedia.org/wiki/Seed), hence the alternative name seed plants. They are a subset of the [embryophytes](https://en.wikipedia.org/wiki/Embryophyte%22%20%5Co%20%22Embryophyte) or land plants. Seed plants (Division Spermatophyta) are the most common plants on earth today. In the fossil record, there are examples of now extinct tree ferns that had seeds, indicating seed plants likely originated from ferns. Seedless plants reproduce via spores, which are single-celled zygotes with a tough cell wall. Seed plants reproduce via seeds, which are multicellular structures with a tough exterior tissue (seed coat) encompassing an embryonic plant. Seeds also typically have nutritive tissue within the seed coat used to nurture the embryo during its dormancy and early development, while spores have no nutritive tissue. Spermatophytes are divided into two major categories, which are the gymnosperms (non-flowering plants) and angiosperms (flowering plants). Gymnosperm translates to “naked seed,” meaning that the seed is not enclosed in a protective structure.

Gymnosperms include [conifers](http://thebiologyprimer.com/pinopsida), [cycads](http://thebiologyprimer.com/cycadopsida), [ginkgos](http://thebiologyprimer.com/ginkgoopsida), and the perplexing [gnetophytes](http://thebiologyprimer.com/gnetopsida). Angiosperm translates to “vesseled seed,” in which the seed is encased in a protective structure, called fruit. It is important to note that not all fruits are fleshy. For example, peanuts are encased in a hard shell. The shell is actually the fruit, where the peanut is the seed.

**General characteristics of phylum spermatophyta**

* The plant has roots, stems, leaves and seed bearing structures
* They produce seeds
* They have chlorophyll hence are photosynthetic
* They have vascular tissue is highly developed with xylem tissue consisting of both xylem tissue and tracheids.

The division spermatophyte consists of two main subdivisions:

1. **Gymnospermatophyta**
2. **Angiospermatophyta.**
3. **Gymnospermatophyta -** are a group of [seed-producing plants](https://en.wikipedia.org/wiki/Spermatophyte) that includes [conifers](https://en.wikipedia.org/wiki/Pinophyta), [cycads](https://en.wikipedia.org/wiki/Cycad), [*Ginkgo*](https://en.wikipedia.org/wiki/Ginkgo), and [gnetophytes](https://en.wikipedia.org/wiki/Gnetophyta%22%20%5Co%20%22Gnetophyta). The term "gymnosperm" comes from a composite word in Greek literally meaning "naked seeds". The name is based on the unenclosed condition of their seeds (called [ovules](https://en.wikipedia.org/wiki/Ovule) in their unfertilized state). The non-encased condition of their seeds contrasts with the seeds and ovules of flowering plants ([angiosperms](https://en.wikipedia.org/wiki/Angiosperms)), which are enclosed within an [ovary](https://en.wikipedia.org/wiki/Ovary_%28botany%29). Gymnosperm seeds develop either on the surface of scales or leaves, which are often modified to form [cones](https://en.wikipedia.org/wiki/Conifer_cone), or solitary as in *Ginkgo*.

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**An image showing various gymnosperms.**

**Characteristics**

* They bear cones of two types, male and female
* After fertilization seeds are not enclosed in a fruit wall.
* They show some xerophytic characteristics such as rolled leaves, needle-shaped leaves, sunken stomata and thick waxy leaves
* Xylem consists mainly of tracheids while phloem does not have companion cells.

**Gymnosperms are subdivided into four main classes:

1. Class Coniferales/Pinales**

They include all the common gymnosperms naturally found in areas with little water. Conifers (Class Pinopsida) are a diverse group of gymnosperms with linear or scaly evergreen leaves that bear seeds within cones. Most conifers are large trees, but a few are shrubs. The world’s tallest tree is a conifer known as coastal redwood (Sequoia sempervirens), and it can grow more than 100 meters. The oldest living tree (estimated to be 4,700 years old) is also a conifer known as Great Basin Bristlecone Pine (Pinus longaeva). They are the dominant plants over huge areas of land. These widespread coniferous forests are considered to be the world's largest terrestrial carbon sink, converting gaseous carbon dioxide into sugar removing it from the atmosphere. In this respect, conifers are a key player in moderating global climate patterns.

 Chaacteristics

* They have needle-like shaped leaves with a thick waxy cuticle
* Mature naked seeds occur at bases of female cones some months after pollination.
1. **Class Cycadales**

Cycadeles resemble palms superficially. Cycads are tropical or sub-tropical plants with a thick, woody trunk with a crown of large, usually pinnate evergreen leaves. They are the most primitive seed plants living today. Seeds are borne in cones that emerge from the centre of the crown atop the plant

* They have long compound leaves which are clustered at the apex of a thick usually short and unbranched stems.
* They have cones which are borne at the apex of the trunk among leaves.
1. **Class Ginkgoales**

Members of this class are very rare. They have deciduous with fan-like leaves. Examples include **Ginkgo biloba**species in china, which is the only species of this order. *Ginkgo biloba* is the only example of a broad-leafed, deciduous gymnosperm tree. All other gymnosperm trees are needle-like, evergreen conifers. Ginkgos are dioecious, having se parate sexes, with trees either being female or male. Unlike most gymnosperms, female plants do not produce cones. Rather, two ovules are formed at the end of a stalk, which can develop into seeds following pollination.

1. **Class Gnetales**

They are [tropical](https://en.wikipedia.org/wiki/Tropical) [evergreen](https://en.wikipedia.org/wiki/Evergreen) [trees](https://en.wikipedia.org/wiki/Tree), [shrubs](https://en.wikipedia.org/wiki/Shrub) and [lianas](https://en.wikipedia.org/wiki/Liana). Unlike all other gymnosperms, gnetophytes have vessel elements in their xylem. Vessel elements are vascular tissue that are much more efficient at transporting water than tracheids. While all vascular plants have tracheids, only gnetophytes and flowering plants (Angiosperms) have vessel elements. This similarity in morphology led early botanists to assume that flowering plants are all descendants of gnetophytes. Some species have been proposed to have been the first plants to be insect-[pollinated](https://en.wikipedia.org/wiki/Pollination) as their fossils occur in association with extinct pollinating [scorpion flies](https://en.wikipedia.org/wiki/Scorpionflies)**.**

**2. Angiospermatophyta.**

This is the most advanced group found almost everywhere. They include grasses, herbs, shrubs and trees.

**Characteristics**

* They are flower bearing and are usually bisexual.
* Seeds are enclosed in an ovary which develops into a fruit.
* Xylem has tracheids and vessels while phloem has companion cells.
* They exhibit double fertilization.

This group is divided into Two Classes

**a) Class Dicotyledonae**

* These are plant whose embryo of seeds has two cotyledons.
* Their leaves are broad and have networks of veins
* Cross section of stems reveals vascular bundles arranged in rings
* They have taproot system
* Centrally placed star-shaped xylem with phloem alternating with arms of the xylem
* Their flowers have floral parts in five or fours

Examples are herbs, shrubs, and trees. The herbs include plants with all stems such as beans, cabbages, tomatoes and black jack while the shrubs include plants with fairly thick stems such as coffee, tea and cocoa

**b) Class Monocotyledonae**

* Their seeds have an embryo with one cotyledon
* Relatively narrow leaves with parallel veins
* The cross section of the stem reveals scattered vascular veins
* No vascular cambium hence no secondary growth
* They bear floral parts in threes

Examples include Maize, grass, wheat, sorghum, sugarcane, coconuts, bananas and sisal.