

Lab-3: Morphological Work

Examination of Gymnospermae samples

Divisio: Spermatophyta (Seeded Plants)

Subdivisio: Gymnospermae (Open seeded Plants)

Classis: Coniferae (cone-bearing plants)

Divisio: SPERMATOPHYTA

SEEDED PLANTS

Plants in this divisio bear root, stem and leaf.

Seeded plants have vascular bundles to carry water and inorganic substances. Their most important features are forming **FLOWER** and **SEED**

Anthophyta : Flowering Plants

Spermatophyta : Seeded Plants

The **flower** is the organ which provides the **sexual reproduction** of the plant. Seed provides **plant propagation** and **reproduction**.

The plants under the Spermatophyta are divided into two subdivisions according to the **presence of the seeds of the flowers in an open or closed ovary**.

I. Subdivisio: **Gymnospermae: Open seeded plants**

II. Subdivisio: **Angiospermae: Closed seeded plants**

In all gymnosperms; the ovule (=small egg), which becomes a seed, rests exposed on a scale (modified leaf) and is not completely enclosed by an ovary at the time of pollination.

Plant ovules: Gymnosperm ovule on left, angiosperm ovule (inside ovary) on right

The name **GYMNOSPERM** combines the Greek root *gymnos*, or “naked,” with *sperma*, or “seed.”

In other words, **GYMNOSPERMS** are naked-seeded plants. They need the cone to protect the seed.

MALE CONE: It is usually small, delicate, not woody, it spreads pollen in a few weeks, then it dries and pours. **Thuja**

FEMALE CONE: Large and woody, can stay in trees for years. **Pinus**

GYMNOSPERMAE: OPEN SEEDED PLANTS

Dwarf shoot: The branch that comes into existence reaches a certain size. Then it stops growing. This is called short shoot.

Long shoot: The branch continues to grow from the top buds is called the long shoot.

MAJOR LEAF ARRAYS SEEN IN GYMNOSPERMS

Fascicle: Leaf sequence from leaves in the form of a bundle. **Cedrus**

Imbricate: The leaves are arranged like tiles or fish scales. **Cupressus, Thuja**

Classis: Coniferae (cone-bearing plants)

a. Fam: Pinaceae (Pine Tree Family)

Key to Pinaceae:

1a. Plant has both short and long shoot

2a. Short shoot has 2 needle-like leaves..... ***Pinus***

2b. Short shoot has 30-40 needle-like leaves..... ***Cedrus***

1b. Plant has just long shoots

3a. Leaves linear, two linear stomatal bands on the lower surface,
cones erect, scales decidous.....***Abies***

3b. Leaves square; cones are not erect, decidous when matured
.....***Picea***

GYMNOSPERM SAMPLES TO BE EXAMINED IN THIS LAB WORK

1. Plants have needle-like leaves bearing on dwarf shoots

1.a. P.N.: *Pinus nigra* (Larch= Karaçam)

1.b. Female cone of *Pinus nigra*

1. a. P.N.: *Pinus nigra* (Pine= Karaçam)

1. Needle-like leaves bearing dwarf shoots

- Pinus nigra is a large **coniferous evergreen tree**, growing to 20–55 metres high at maturity and spreading to 6 to 12 meters wide.
- The bark is dark grey and fissured.
- The **leaves are 8-10 cm**, needle-like **and flexible**.
- Long shoots are leafy while young, then the leaves are poured.
- The bases of leaves are covered with a short, dark-colored sheath..
- Stem and foliage have resin channels.

1. b. Female Cone of *Pinus nigra* (Pine= Karaçam)

The mature **seed cones are 5–10 cm** (rarely to 11 cm) long, with rounded scales.

The **seeds are dark grey**, 6–8 mm long, with a yellow-buff wing 20–25 mm long; they are **wind-dispersed** when the cones open from December to April.

Pinus nigra

Male cones are yellow in color.

The female cone is found perpendicular to the trunk of the branches, at the tip of the short shoot.

Female cones are 4-8 cm long, almost without stem. Seeds are 1-2 cm, winged and wings are yellowish-brown and shiny.

1.c. *Pinus nigra*

Pollen investigation
(next week's subject)

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half page)»

2. Plants have needle-like leaves bearing both dwarf and long shoots

1. PN: *Cedrus libani* (Lebanon Cedar=Lübnan Sediri)

****Cedrus libani*** is an **evergreen coniferous** tree growing up to 40 m tall, with a trunk up to 2.5 m in diameter.

***The shoots** are **dimorphic**, with **long shoots and dwarf shoots.**

- *The **leaves are needle-like,**
- one by one on long shoots.,** and
- in clusters of 15-45 on the dwarf shoots;**
- they are 5–30 mm** in length,
- quadrangular in cross-section,**
- vary from green to glaucous blue-green**
- with bands** on all **four sides.**

3. Plants have needle-like leaves bearing long shoots.

1. P.N: *Picea pungens* var. *glauca* (spruce fir= Ladin, Mavi Çam)

The spruce is a large coniferous evergreen tree which grows normally to 15 to 30 metres tall.

The bark is thin and scaly, flaking off in small circular plates 5 to 10 centimetres (2.0 to 3.9 in) across.

***The long shoots are pale buff-brown, glabrous (hairless).**

***The leaves are**

-needle-like are evergreen, -borne singly and at c. right angles from all sides of the shoot,

-1.6-3 cm long,

-4-angled,

-stiff and sharply spine-tipped (Sharply pointed) , silvery to bluegreen with whitish bands.

The cones are

-pendulous, slender, cylindrical,

-3 to 7 cm long and

-They have thin, flexible scales with a smoothly rounded margin.

-The seeds are black, 2 to 3 mm long, with a slender, 5 to 8 mm long pale brown wing.

2. PN: *Abies bornmuelleriana* (Turkish Fir=Göknar) (synonym: *A. nordmanniana* subsp. *equi-trojani*)

It is a large evergreen coniferous tree growing up to 55–61 m tall and with a trunk diameter of up to 2 m.

The tip of the leaf is usually **retuse/emarginate**.

The leaves remain round traces on the stem when they dropped.

The leaves are

***needle-like, flattened, linear,**

***1.8–3.5 cm long and 2 mm wide by 0.5 mm thick,**

***glossy dark green above, and with two blue-white bands below.**

The **cones** are **10–20 cm long and 4–5 cm broad**, with about 150–200 scales, each scale with an **exserted bract** and **two winged seeds**; they disintegrate when mature to release the seeds.

4. Scale-like leaves bearing conifers

Key to Cupressaceae:

1a. Cone woody

2a. Cone scales are peltate, seeds are winged***Cupressus***

2b. Cone 1,5 cm long, 6-8 scaled, scales are spurred.....***Thuja***

1b. Cone drupe..... ***Juniperus***

4. Scale-like leaves bearing conifers

Family: Cupressaceae (Cypress= Servigiller)

- Leaves are subulate or reduced into scales.
- Cones are woody or drupe type.

1. *Cupressus sempervirens* (Mediterranean cypress=Servi)

C. sempervirens* is a medium-sized coniferous **evergreen tree to 35 m tall.

*It is very long-lived, with some trees reported to be over 1,000 years old.

*The **foliage grows in dense sprays**, **dark green** in colour.

*The leaves are small, **scale-like**, **2–5 mm long**, and produced on rounded (not flattened) shoots.

*Leaves have imbricate formation.

The **male cones are cylindrical, 3–5 mm** long.

The female cones are spherical, 25–40 mm long, with **10-14 scales, green at first, maturing brown.**

4. Scale-like leaves and woody cones bearing conifers

2. PN: *Thuja orientalis* (Arborvitae = Doğu mazısı)

*It is a small, slow-growing tree, to 15–20 m tall.

*The foliage forms in **flat planes with scale-like leaves 2–4 mm long.**

***Scale-like leaves are arranged in the order of imbricate** and they have secretory channels.

The female cones are **15–25 mm long, green ripening brown** in about eight months from pollination, and have **6–12 thick scales arranged in opposite pairs**.

The female are folded to outward.

The seeds are **4–6 mm long, with no wing**.

4. Needle like leaves and bakka type fruit bearing gymnosperms

PN: *Juniperus oxycedrus* (Prickly juniper =Katran ardıcı)

- A dioic shrub, sometimes a small tree.
- The *Juniperus oxycedrus* tree is very variable in shape, forming a spreading shrub 2–3 m tall to a small erect tree 10–15 m tall.
- The leaves are subulat and they stand vertically to the branch.
- It has **needle-like leaves in whorls of three** (triple vertisillat) (**whorled**); the leaves are green, 5–20 mm long and 1–2 mm broad, **with a double white band** (split by a green midrib) **on the inner surface.**

•The female **cones are**

***berry-like (drupe)**, green ripening to orange-red with a variable pink waxy coating;

*they are **spherical**,

*7–12 mm diameter,

*The seeds are dispersed when birds eat the cones, digesting the fleshy scales and passing the hard seeds in their droppings.

•**Female** cones have **3 carpels**.

2. PN: *Juniperus nana* (shrubby juniper=Cüce Ardıç)

- They are monoic shrubs of 45-50 cm in length, seen as the frequent clusters in the field.
- Leaves are narrower and shorter, in the order of vertisillate.

*Fruits are c. 1 cm in diameter, green for the first year and the second year they are bluish black.

*There are 3 carpel traces on the top of the fruit.

*The fruit is edible.