YAKEEN NEET 2.0

2026

Plant Kingdom

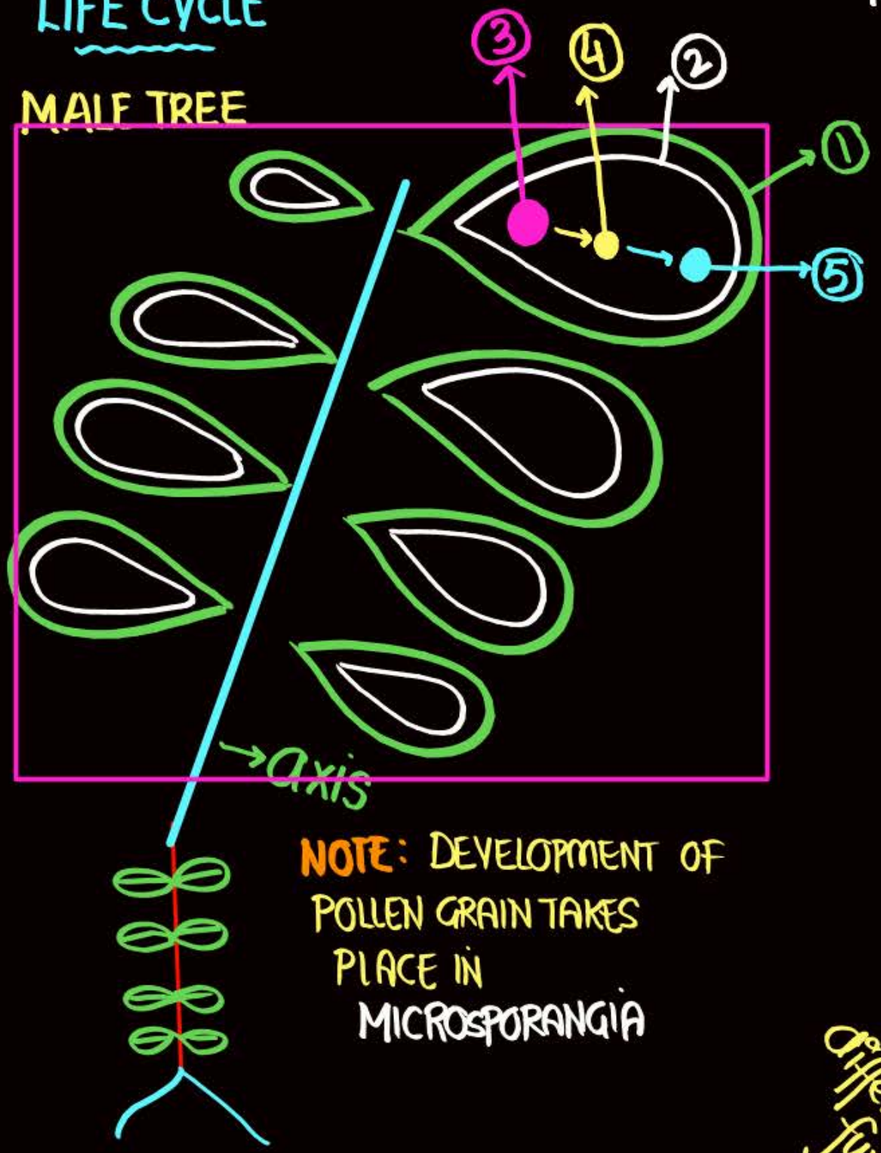
Botany | Lecture - 07

Rupesh Chaudhary Sir

Topics to be covered

1. Gymnosperm
2. angiosperm
3. Summary
4.

LIFE CYCLE



NOTE: DEVELOPMENT OF POLLEN GRAIN TAKES PLACE IN MICROSPORANGIA

MALE TREE/SPOROPHYTE, 2N (ROOT, STEM, LEAVES).

↓

MALE CONE/MICROSPORANGIATE/Male Strobilus, 2N.

↓

IS Aggregation/collection of ① MICROSPOROPHYLL, 2N

↓ ON

MICROSPORANGIA PRESENT ON MICROSPOROPHYLL ②

↓ IN

③ MICROSPORE MOTHER CELL, 2N IN MICROSPORANGIA (घर)

↓ Meiosis

④ MICROSPORE, N

↓ FORM

⑤ MALE GAMETOPHYTE, N (POLLEN GRAIN)

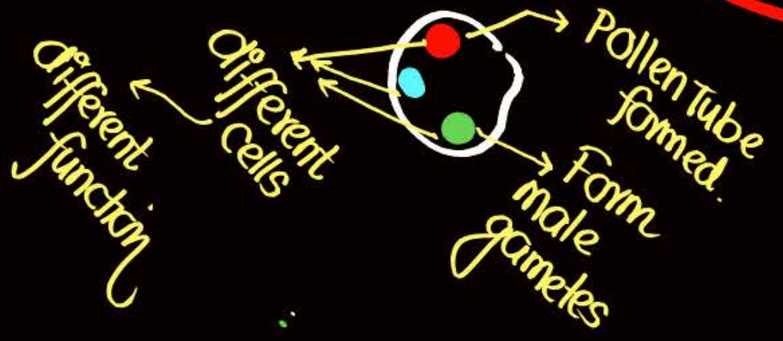
have limited no. of cell.

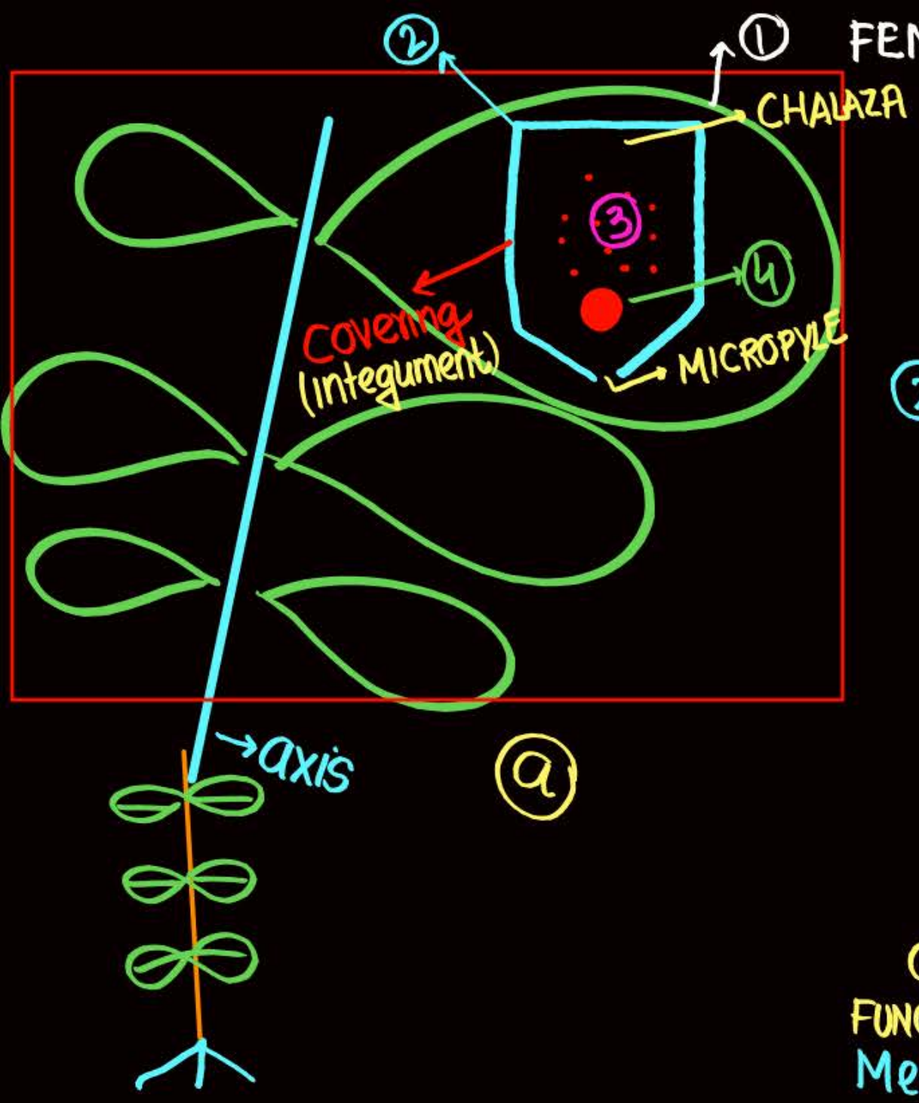
Reduction in gametophyte.

POLLEN GRAIN RELEASE FROM MICROSPORANGIA (घर)

POLLINATION (WIND)

ANEMOPHILY





FEMALE TREE/SPOROPHYTE (ROOT, STEM, LEAVES), 2N.

↓

Female cone/strobilus/MACROSPORANGIATE, 2N.

①

↓

Collection of MEGASPOROPHYLL, 2N

↓

② Megasporangia (OVULE) 2N present on megasporophyll

↓

IN

↓

CELLS OF NUCELLUS ③ 2N.

↓

one of cell of nucellus at Micropyle end,

Large in size → Megaspore mother cell, 2n ④

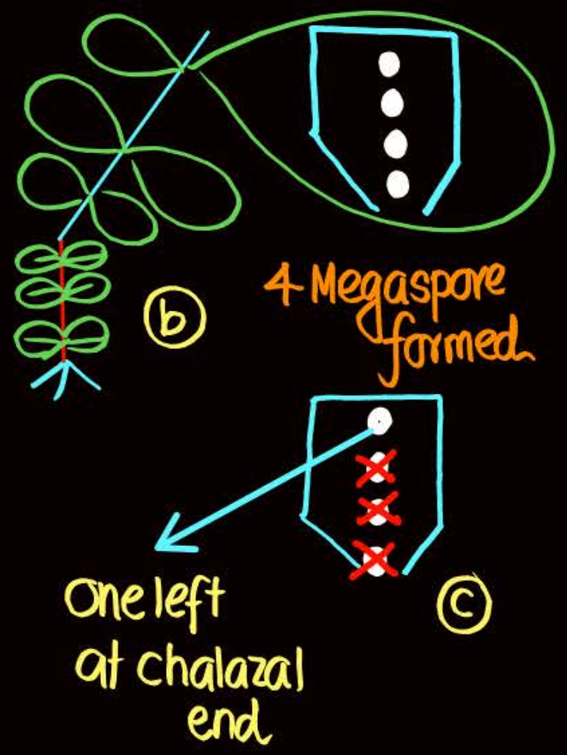
↓

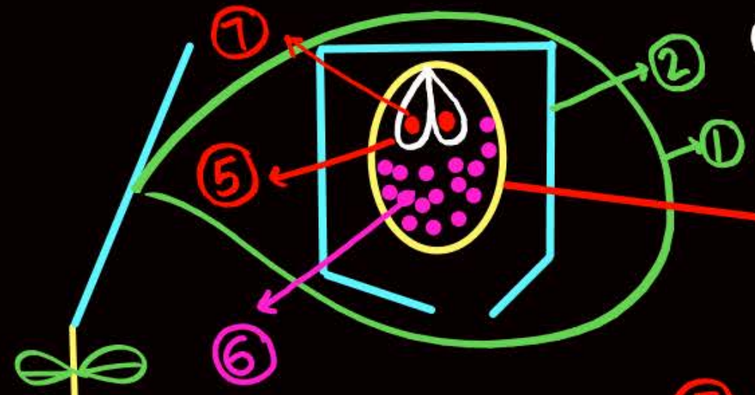
MEIOSIS

Four Megaspore, are formed N

3 are degenerated

ONLY ONE FUNCTIONAL Megaspore left, (N)





One functional megaspore left, N.
in Ovule / megasporangia

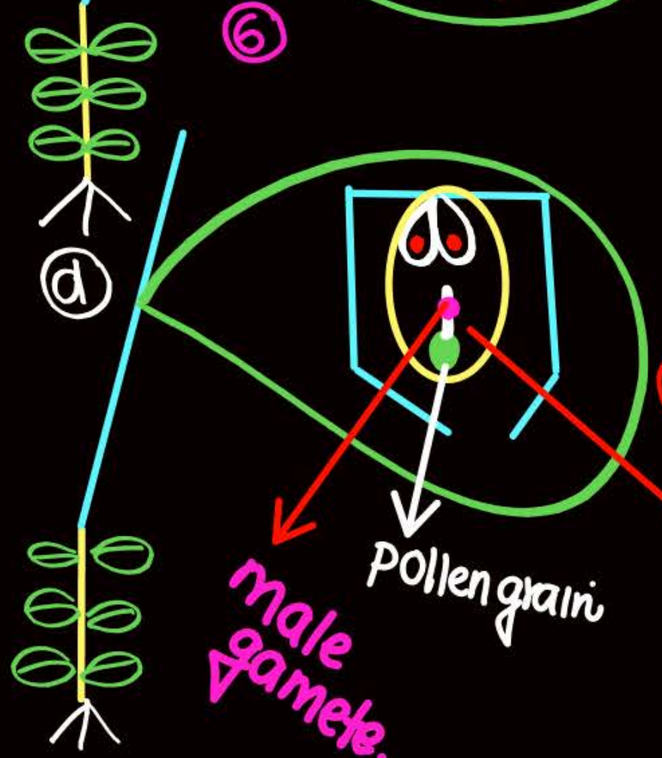
FORM FEMALE GAMETOPHYTE, N.
IN

5 Archegonia (female sex organ)

IN

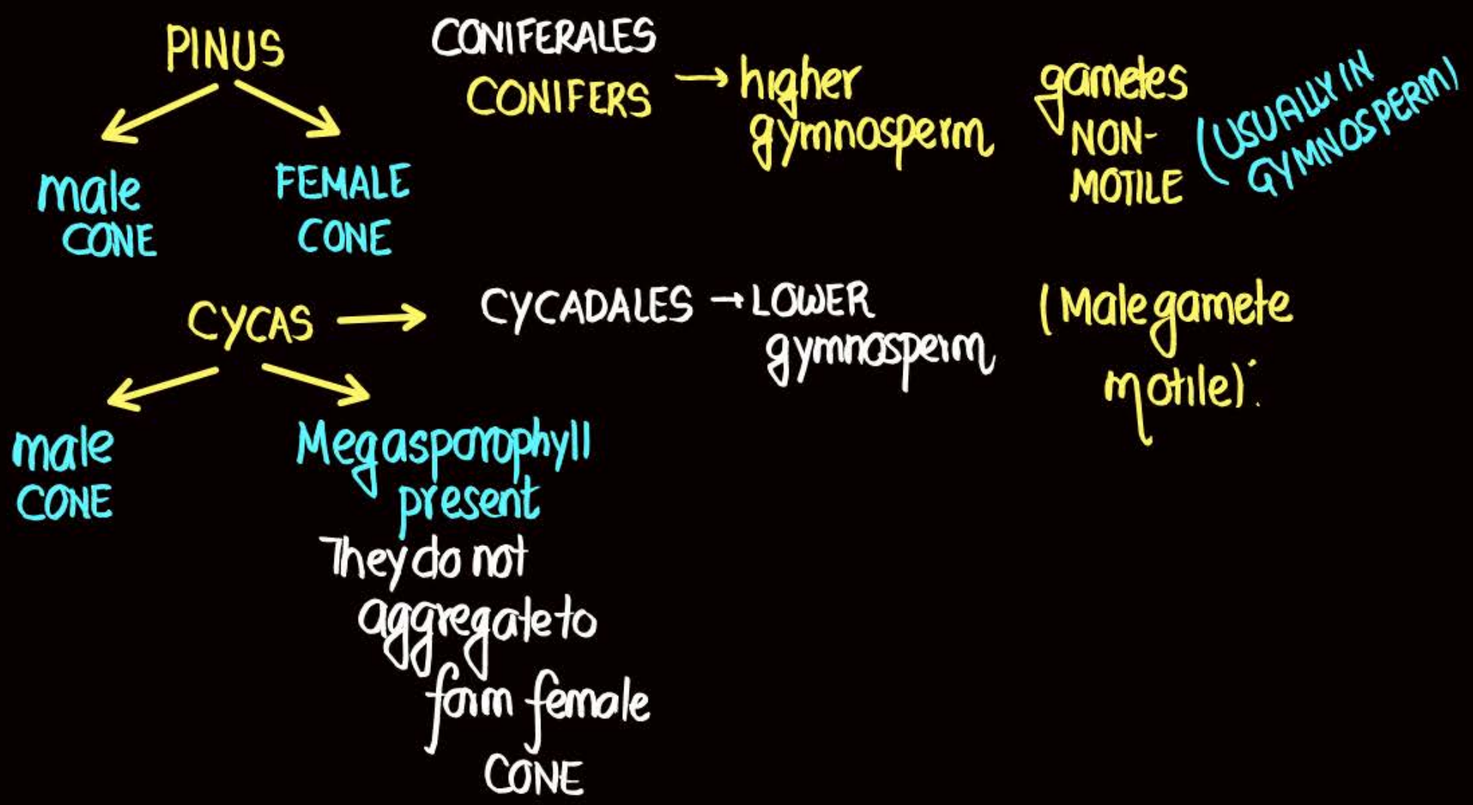
7 female gamete / egg (N)

Endosperm 6
(Nutritive Tissue)
Haploid, Formed
Before fertilisation



Seed fall on ground/soil
→ germinate to form gymnosperm

Pollen grain enter into female gametophyte
↓
Pollen Tube carry male gamete.
↓
Male gamete Release near mouth of archegonia
↓
(n) (n)
Male gamete fertilise egg
↓
Zygote (2N)
↓
Embryo (2N)
(part of seed)


PINUS
male CONE
FEMALE CONE
CONIFERALES
CONIFERS → higher gymnosperm
gametes NON-MOTILE (USUALLY IN GYMNOSPERM)
CYCAS →
CYCADALES → LOWER gymnosperm
(Male gamete motile).
male CONE
Megasporophyll present
They do not aggregate to form female CONE

3.4 GYMNOSPERMS

The gymnosperms (*gymnos* : naked, *sperma* : seeds) are plants in which the ovules are not enclosed by any ovary wall and remain exposed, both before and after fertilisation. The seeds that develop post-fertilisation, are not covered, i.e., are naked. Gymnosperms include medium-sized trees or tall trees and shrubs (Figure 3.4).

Naked

Ovule

Not covered

Seed

By ovary

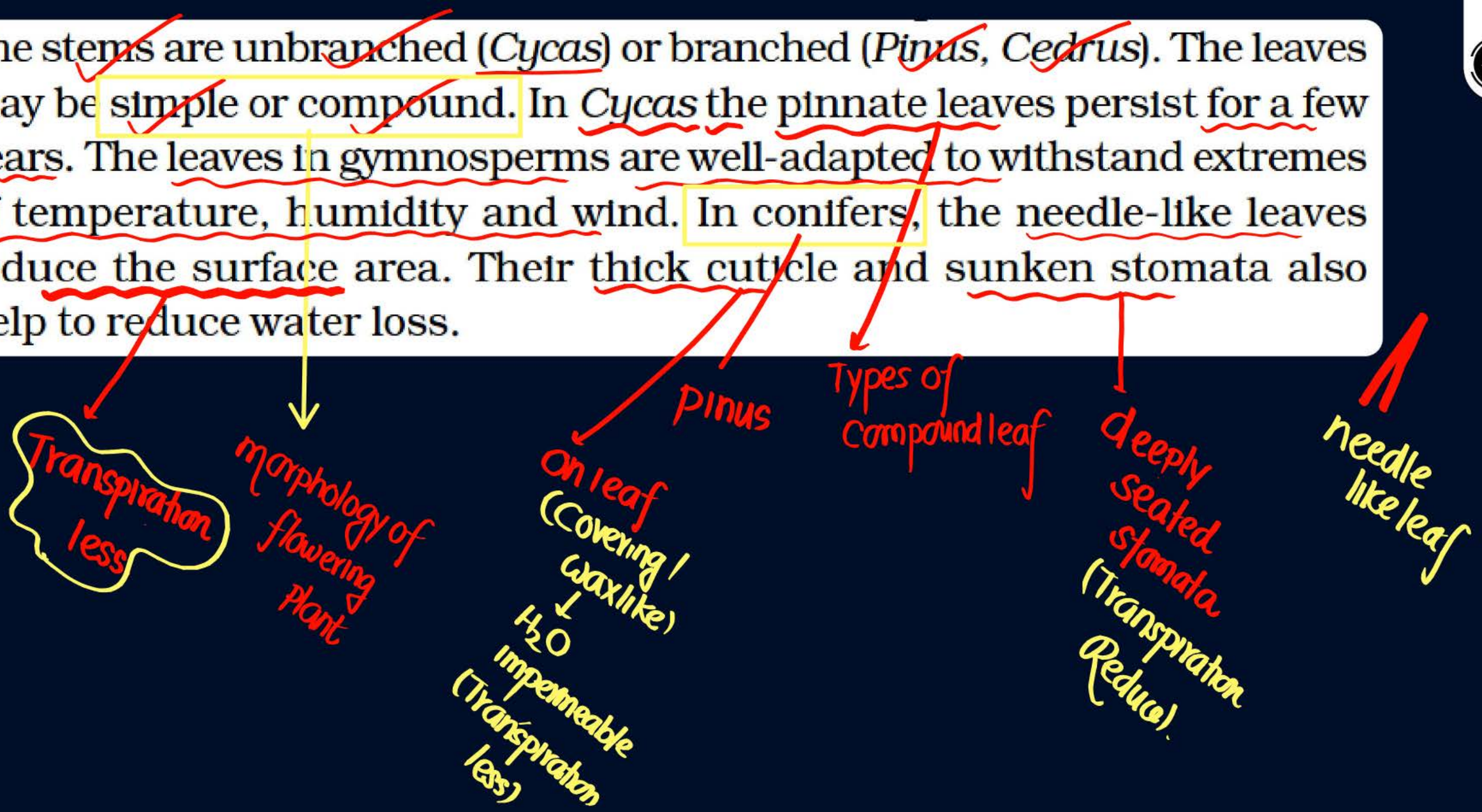
By fruit

One of the gymnosperms, the giant redwood tree *Sequoia* is one of the tallest tree species. The roots are generally tap roots. Roots in some genera have fungal association in the form of **mycorrhiza** *(Pinus)*, while in some others *(Cycas)* small specialised roots called coralloid roots are associated with N_2- fixing cyanobacteria.

arise from Radicle part of embryo

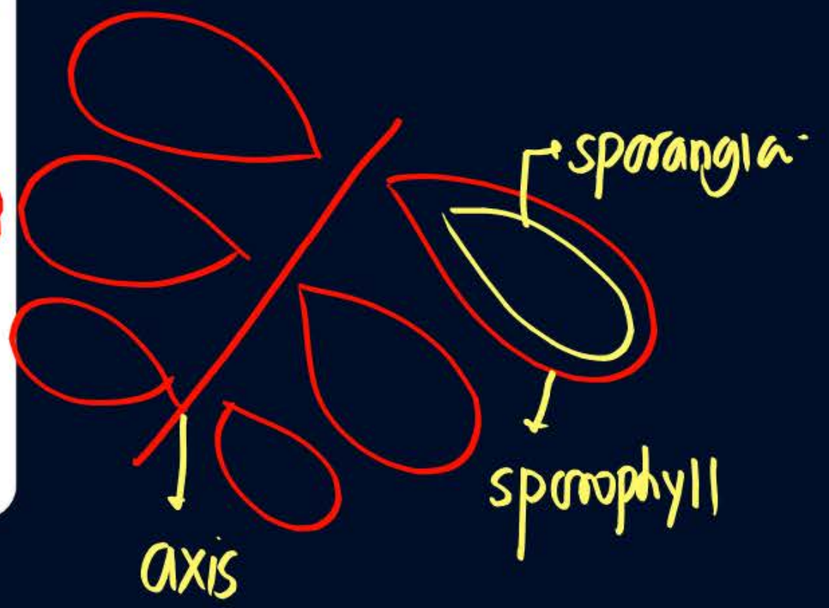
Anabaena.

The stems are unbranched (*Cycas*) or branched (*Pinus*, *Cedrus*). The leaves may be simple or compound. In *Cycas* the pinnate leaves persist for a few years. The leaves in gymnosperms are well-adapted to withstand extremes of temperature, humidity and wind. In conifers, the needle-like leaves reduce the surface area. Their thick cuticle and sunken stomata also help to reduce water loss.



Microsporophylls → Microsporangia → megasporangia → Megasporophylls.

The gymnosperms are heterosporous; they produce haploid microspores and megaspores. The two kinds of spores are produced within sporangia that are borne on sporophylls which are arranged spirally along an axis to form lax or compact strobili or **cones**. The strobili bearing **microsporophylls** and **microsporangia** are called microsporangiate or **male strobili**.



The microspores develop into a male gametophytic generation which is highly reduced and is confined to only a limited number of cells. This reduced gametophyte is called a **pollen grain**. The development of pollen grains take place within the microsporangia.

The cones bearing megasporophylls with ovules or **megasporangia** are called macrosporangiate or female **strobili**. The male or female cones or strobili may be borne on the same tree (*Pinus*). However, in *cycas* male cones and megasporophylls are borne on different trees.

dioecious

monoecious

female cone absent

Large size

The megaspore mother cell is differentiated from one of the cells of the nucellus. The nucellus is protected by envelopes and the composite structure is called an **ovule**. The ovules are borne on megasporophylls which may be clustered to form the female cones. The megaspore mother cell divides meiotically to form four megaspores.

megasporangia

Integument

3 degenerate

One of the megaspores enclosed within the OVULE **megasporangium** develops into a multicellular female gametophyte that bears two or more **archegonia** or female sex organs. The multicellular female gametophyte is also retained within megasporangium./ OVULE

Unlike bryophytes and pteridophytes, in gymnosperms, the male and the female gametophytes do not have an independent free-living existence. They remain within the sporangia retained on the sporophytes. The pollen grain is released from the microsporangium.

They are carried in air currents and come in contact with the opening of the ovules borne on megasporophylls. The pollen tube carrying the male gametes grows towards archegonia in the ovules and discharge their contents near the mouth of the archegonia. Following fertilisation, zygote develops into an embryo and the ovules into seeds. These seeds are not covered.

Micropyle

(male gamete)

Naked

(a)

(b)

(c)

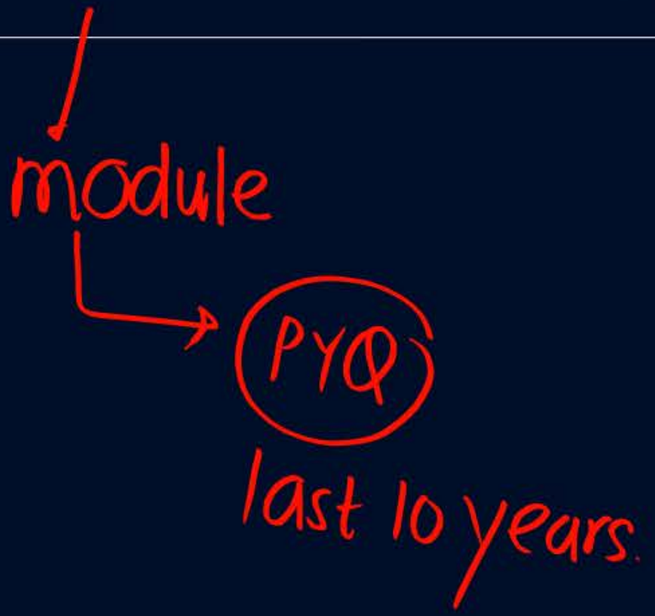
Gymnosperms: (a) *Cycas* (b) *Pinus* (c) *Ginkgo*

Character	Algae	Bryo.	Pteri.	Gymno.	Angio.
Embryo					
Seed					
Ovary, Flower					
Ovule					
Xylem, Phloem (Vascular tissue, sporophyte)					
Root, stem, leaf (sporophyte)					
Homo/Hetero.					

Character	Algae	Bryo.	Pteri.	Gymno.	Angio.
Male sex Organ Female sex Organ					
Endosperm					
Pollen grain					

Character	Algae	Bryo.	Pteri.	Gymno.	Angio.
Life cycle					
Dominant Body					
Gametophyte (Multi cellular)					
Sporophyte (2n)					

Homework from YAKEEN NEET 2.0 2026 Module



THANK YOU