FREE NOTES · NCERT + NEET LEVEL

Plant Kingdom

Classification systems ke types, algae (hari, bhoori, laal), bryophytes (liverworts, mosses), pteridophytes, gymnosperms, angiosperms, aur alternation of generations wale plant life cycles.

01 Classification systems
02 Algae
03 Algae ki classes
04 Bryophytes
05 Pteridophytes: pehle vascular plants
06 Gymnosperms: nange beej
07 Angiosperms & plant life cycles
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01 Classification systems

System	Basis
Artificial (Linnaeus)	Kuch vegetative/sexual characters (jaise androecium)
Natural (Bentham & Hooker)	Natural samanta, andar + bahar ke features
Phylogenetic	Evolutionary rishte

Numerical taxonomy: computer aur saare characters (barabar weight). **Cytotaxonomy**: chromosome number, structure. **Chemotaxonomy**: chemical constituents.

02 Algae

Saral, chlorophyll wale, thalloid, autotrophic, zyada tar paani me. Roop: colonial (*Volvox*), filamentous (*Ulothrix*, *Spirogyra*), bade (kelps).

- **Vegetative** reproduction: fragmentation. **Asexual**: zoospores (flagellated).
- **Sexual**: isogamous (ek jaise gametes, *Spirogyra* bina flagella, *Ulothrix* flagella wale), anisogamous (*Eudorina*), oogamous (*Volvox*, *Fucus*).
- Uses: dharti ke total CO_2 fixation ka aadha; khana (*Porphyra*, *Laminaria*, *Sargassum*); *Gelidium*, *Gracilaria* se agar; algin (bhoori), carrageen (laal); *Chlorella* antriksh yatriyon ka protein supplement.

03 Algae ki classes

	Chlorophyceae (hari)	Phaeophyceae (bhoori)	Rhodophyceae (laal)
Pigments	Chl a, b	Chl a, c, **fucoxanthin**	Chl a, d, **r-phycoerythrin**
Stored food	Starch	Mannitol, laminarin	Floridean starch
Cell wall	Cellulose + pectose	Cellulose + algin	Cellulose, pectin, polysulphate esters
Flagella	2–8, barabar, apical	2, asamaan, lateral	Nahi
Habitat	Meetha, khaara, namkeen paani	Zyada tar samundar	Zyada tar samundar, gehra paani
Examples	*Chlamydomonas*, *Volvox*, *Ulothrix*, *Spirogyra*, *Chara*	*Ectocarpus*, *Dictyota*, *Laminaria*, *Sargassum*, *Fucus*	*Polysiphonia*, *Porphyra*, *Gracilaria*, *Gelidium*

04 Bryophytes: "plant kingdom ke amphibians"

- Zameen pe rehte par fertilisation ke liye paani chahiye. Geeli, chhayadaar jagah. Chattanon pe plant succession me zaroori; *Sphagnum* (peat) fuel aur packing me.
- Plant body **gametophyte** (dominant, haploid), rhizoids ke saath; asli root, stem, leaves nahi.
- Sex organs: **antheridium** (male, biflagellate antherozoids), **archegonium** (female, surahi jaisa, ek egg).
- Zygote → **sporophyte** (foot, seta, capsule), gametophyte pe nirbhar; meiosis se spores.
- **Liverworts**: thalloid (*Marchantia*), asexual ke liye gemmae. **Mosses**: pehle protonema phir leafy stage (*Funaria*, *Polytrichum*, *Sphagnum*); spores bikharne ka khaas tareeka.

05 Pteridophytes: pehle vascular plants

- **Xylem aur phloem** wale pehle zameeni paudhe. Ferns, horsetails (*Equisetum*), *Selaginella*, *Lycopodium*, *Psilotum*, *Pteris*, *Dryopteris*, *Adiantum*.
- Main plant body **sporophyte** (root, stem, leaves: microphylls ya macrophylls).
- Sporophylls pe sporangia; kabhi **strobili**/cones me.
- Spores → chhota free-living **prothallus** (gametophyte); fertilisation ke liye paani.
- Zyada tar homosporous; *Selaginella* aur *Salvinia* **heterosporous** (micro- aur megaspores) ⇒ seed habit ki shuruaat.

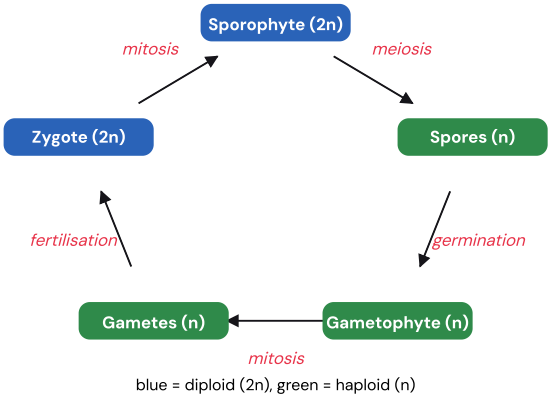
06 Gymnosperms: nange beej

- Ovules ovary me band nahi; beej khule. Ped aur jhaadiyan; giant redwood *Sequoia* sabse oonche pedon me.
- Tap roots; *Cycas* ki **coralloid roots** (cyanobacteria ke saath), *Pinus* me **mycorrhiza**.
- Sui jaisi pattiyan, moti cuticle aur dhanse stomata (paani bachate).
- Heterosporous: male cones me microsporophylls, female cones me megasporophylls. Gametophyte free-living nahi. Hawa se pollen ovule tak; pollen tube gametes le jaati.
- Examples: *Cycas*, *Pinus*, *Ginkgo*, *Cedrus*.

07 Angiosperms & plant life cycles

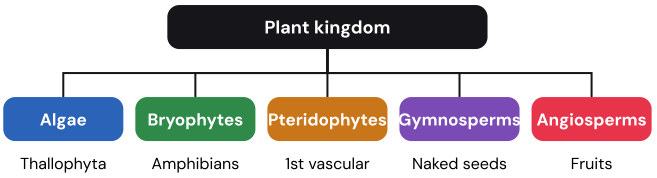
Phool wale paudhe, beej phal ke andar. Dicots aur monocots. Size *Wolffia* (bahut chhota) se *Eucalyptus* (100 m se zyada). **Double fertilisation**: ek male gamete + egg ⇒ zygote; doosra + secondary nucleus ⇒ triploid endosperm.

Life cycle	Dominant phase	Example
Haplontic	Gametophyte (n); sirf zygote 2n	*Volvox*, *Spirogyra*, *Chlamydomonas*
Diplontic	Sporophyte (2n)	Seed plants, *Fucus*
Haplo-diplontic	Dono multicellular	Bryophytes (n dominant), pteridophytes (2n dominant), *Ectocarpus*, *Polysiphonia*, kelps



Alternation of generations

08 Extra + tricks



Cryptogams (beej nahi: algae → pteridophytes) vs phanerogams (beej wale)

- **Cryptogams** (chhupe sex organs): algae, bryophytes, pteridophytes. **Phanerogams** (beej wale): gymnosperms, angiosperms.
- Pteridophyte classes: **Psilopsida** (*Psilotum*), **Lycopsida** (*Selaginella*, *Lycopodium*), **Sphenopsida** (*Equisetum*), **Pteropsida** (*Dryopteris*, *Pteris*, *Adiantum*).
- Gymnosperm upyog: **taxol** (cancer ki dawa, *Taxus*), **ephedrine** (khansi, *Ephedra*), resins, turpentine; *Ginkgo* = living fossil; *Zamia pygmaea* = sabse chhota gymnosperm.
- *Azolla* (paani ka fern) + *Anabaena* dhaan ke khet me nitrogen fix; *Sphagnum* paani rokta (zinda cheezon ki packing).
- Algae pigments ka trick: **G-B-R** → Hari: chl a, b; Bhoori: fucoxanthin; Laal: phycoerythrin (laal algae sabse gehre paani me).

09 Important Q&A

Q1. Bryophytes ko plant kingdom ke amphibians kyun kehte?

Zameen pe rehte par antherozoids ko egg tak tairne ke liye paani chahiye.

Q2. Kaun se pteridophytes heterosporous aur ye zaroori kyun?

Selaginella, *Salvinia*; megaspore ko rokne se seed habit ka evolution hua.

Q3. Ploidy: protonema, endosperm (angiosperm), prothallus, zygote.

n, 3n, n, 2n.

10 Common mistakes

- Bryophyte ki main body sporophyte kehna (gametophyte hai).
- Pigments mix karna: fucoxanthin = bhoori, phycoerythrin = laal.
- Gymnosperm endosperm ko triploid kehna (haploid hai, fertilisation se pehle banta).
- Sochna ki pteridophytes me beej hote.

11 Practice (NEET style)

1. Agar kisse milta?
2. Coralloid roots kisme?
3. Pehle vascular plants?
4. Laal algae ka stored food?
5. *Ectocarpus* ka life cycle?

ANSWERS

1) *Gelidium*, *Gracilaria* · 2) *Cycas* · 3) Pteridophytes · 4) Floridean starch · 5) Haplo-diplontic

12 Quick revision: exam se 5 minute pehle

ALGAE

- Hari: starch; bhoori: fucoxanthin, laminarin; laal: phycoerythrin, floridean starch.

BRYOPHYTES

- Gametophyte dominant.
- Paani chahiye; amphibians.

PTERIDOPHYTES

- Pehle vascular; sporophyte dominant.
- Selaginella heterosporous.

SEED PLANTS

- Gymno: nange beej.
- Angio: double fertilisation, 3n endosperm.

Koi doubt? padhaiadda.netlify.app pe AI Doubt Solver se poocho, ya is chapter ka mock test do.