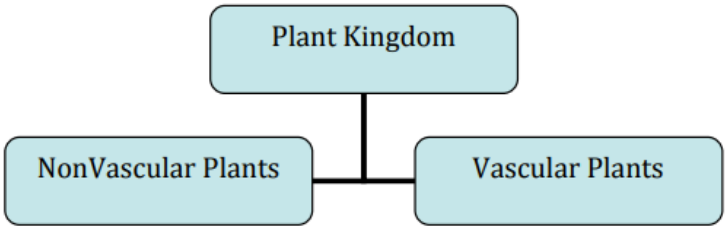
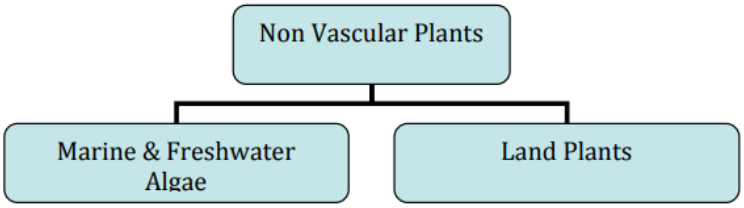
The 6 th. Lab.

Models of plant kingdom

Kingdom Plantae includes multi-cellular organisms that produce their own biological macromolecules through photosynthesis using light as an energy source. With very few exceptions, all plants are photoautotrophic ("light" "self" "feeding"). Plants are essential for the survival many different organisms. Plant kingdom includes algae, bryophytes, pteridophytes, gymnosperms and angiosperms.

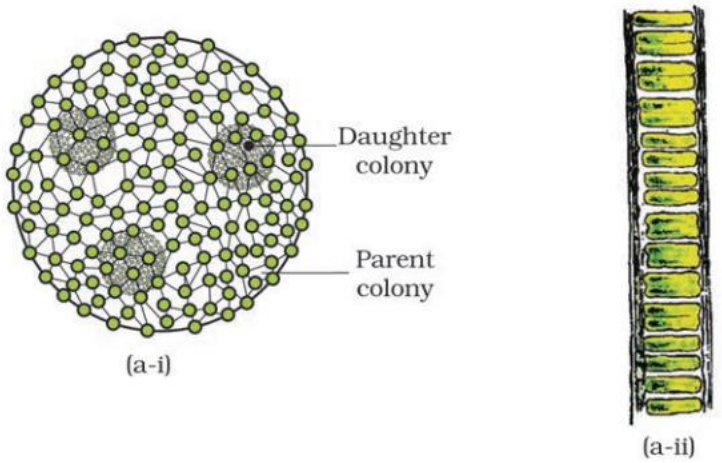


The non-vascular plants are divided into :



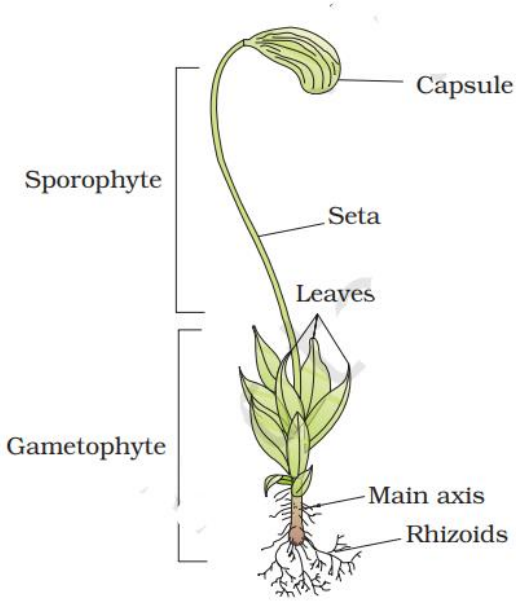
Algae are chlorophyll-bearing simple, thalloid, autotrophic and largely aquatic organisms. Depending on the type of pigment possessed and the type of stored food, algae are classified into three classes, namely Chlorophyceae, Phaeophyceae and Rhodophyceae. The algae reproduce by vegetative, asexual and sexual methods. Vegetative reproduction is by fragmentation. Each fragment develops into a thallus. Asexual reproduction is by the production of different types of

spores, the most common being the zoospores. They are flagellated (motile) and on germination gives rise to new plants. Sexual reproduction takes place through fusion of two gametes. These gametes can be flagellated and similar in size (as in *Ulothrix*) or non-flagellated (non-motile) but similar in size (as in *Spirogyra)*. Such reproduction is called isogamous. Fusion of two gametes dissimilar in size, is termed as anisogamous. Fusion between one large, non-motile (static) female gamete and a smaller, motile male gamete is termed oogamous, e.g., *Volvox*.



(a-l : volvox. and a-ll : Ulothrix.)

Bryophytes (non-vascular land plants) are plants which can live in soil but are dependent on water for sexual reproduction. Their plant body is more differentiated than that of algae. It is thallus-like and prostrate or erect and attached to the substratum by rhizoids. They possess root-like, leaf-like and stem-like structures. The bryophytes are divided into liverworts and mosses. The plant body of liverworts is thalloid and dorsiventral whereas mosses have upright, slender axes bearing spirally arranged leaves. The main plant body of a bryophyte is gamete-producing and is called a gametophyte. It bears the male sex organs called antheridia and female sex organs called archegonia. The male and female gametes produced fuse to form zygote which produces a multicellular body called a sporophyte. It produces haploid spores. The spores germinate to form gametophytes.



Mosses : Funaria, gametophyte and sporophyte

VASCULAR PLANTS:

• Have vascular, conductive tissues.

• Xylem conducts water and dissolved minerals generally upward in plants.

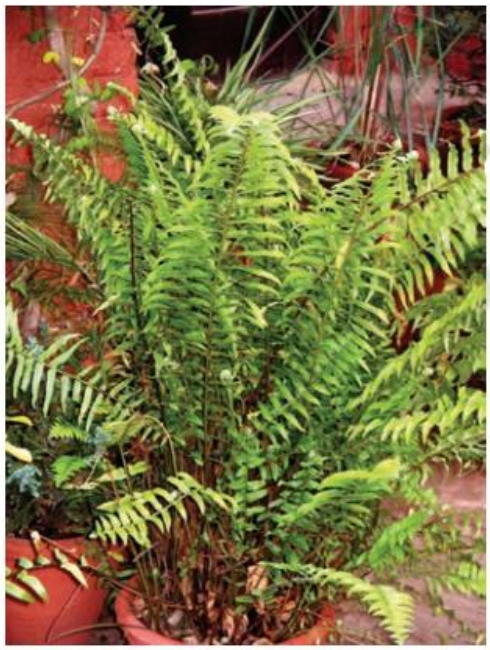
• Phloem conducts sugars generally downward from the canopy to the rest of the plant.

It is divided to tow broad categories of plants :

1. Non-seed Vascular Land Plants:

   The **Pteridophytes** include horsetails and ferns. Pteridophytes are used for medicinal purposes and as soil-binders. They are also frequently grown as ornamentals. Evolutionarily, they are the first terrestrial plants to possess vascular tissues (xylem and phloem). In pteridophytes the main plant is a sporophyte which is differentiated into true root, stem and leaves. These organs possess well-differentiated vascular tissues. The sporophytes bear sporangia which produce spores. The spores germinate to form gametophytes which require cool, damp places to grow. The gametophytes bear male and female sex organs called antheridia and archegonia, respectively. Water is required for

transfer of male gametes to archegonium where zygote is formed after fertilization. The zygote produces a sporophyte.



2. Seed Vascular Land Plants:

(mature plants produce seeds as reproductive structures).

- **Gymnosperms: "naked seed"**
  a) Conifers such as pines, spruces, redwoods, firs, ginkgo etc.
  b) Seeds not enclosed in fleshy fruit but held in woody female reproductive structures (cones)
  c) Staminate (male) cones produce pollen: wind pollinated
  d) Vital contributors of timber for housing, fuel wood, habitat for many species etc.
  e) Secondary Growth.

- **Angiosperms: All flowering plants:**
  - Biggest group of plants today. Includes all grasses, crop plants, shrubs, most trees (oaks, willows, beeches, sycamores, eucalyptus, etc)
    - Seeds enclosed in fleshy fruits
    - Flowers contain male & female reproductive structures

Angiosperms can be further divided into two subgroups – **monocots** and **dicots** – based on the characteristics shown below: