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Course: Deg.-II (Subs.)
Topic: Morphological Adaptations of Hydrophytes
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Morphological Adaptations of Hydrophytes:

Root system is poorly developed. Roots are often poorly developed (e.g. Wolffia, Salvinia) or completely absent.

Root hairs have completely disappeared in some species of Ceratophyllum. However, many hydrophytes have well developed root systems.

For example, Eichhornia and Pistia have well developed adventitious roots. In these free-floating rosette plants, the roots are at least partly responsible for preserving the stability of their rosette leaves.

2. Roots of floating hydrophytes show very poor development of root hairs, absence of true root caps, with root pockets to protect their tips from injuries. (e.g. ***Eichhornia*****)**

3. Rooted hydrophytes like ***Hydrilla, Vallisnera, Elodia*** derive their nourishment through their body surfaces. More plants partly depend on their roots for the absorption of minerals from the soil. Roots are totally absent in ***Ceratophyllum, Salvinia, Azolla, Utricularia*** **etc.**

4. In ***Jussiaea repens*** two types of roots develop. Some of them are normal, while others are negatively geotropic, floating roots, spongy in nature and keep the plants afloat.

5. In free floating hydrophytes, the stem is thick and short, floating on the surface of water (e.g.) ***Eichhornia.*** The stem may be well developed (e.g.,

Ceratophyllum, Hydrilla), reduced (e.g. Wolffia ,Spirodela), or modified into rhizome (e.g., Vallisneria). Stem is spongy due to well developed aerenchyma. The spongy and elongated petioles of water hyacinth exhibit the development of so-called aerenchyma.

6. In ***Nymphaea*** and ***Nelumbium*** the stem is a rhizome. These rhizomes live for many years and produce leaves every year.

7. In rooted plants with floating leaves, the leaves are large, flat and entire (e.g.) ***Nymphaea, Victoria regia.*** Their upper surface is coated with wax. The wax coating protects the leaves from mechanical and physical injuries and also prevents clogging of stomata by water.

8. In floating plants of ***Eichhornia, Trapa*** **etc.,** the petioles become characteristically swollen and become spongy, providing buoyancy.

9. Plants such as ***Limnophylla heterophylla, Sagittaria, Ranunculus, Salvinia, Azolla*** etc show heterophylly, with submerged dissected leaves offering little resistance against the water currents, and absorbing dissolved carbon-di-oxide from water. The aerial leaves show typical mesophytic features. It acts as foliage leaf.

10. Pollination (e.g. Vallisneria) and dispersal of fruits and seeds are accomplished by the agency of water.

Many hydrophytes show heterophylly, i.e., production of different forms of leaves in the same plant. In submerged aquatics with free floating aerial leaves, the submerged leaves are generally linear, ribbon-shaped or finely dissected while the aerial leaves are complete and rounded or lobed.

In Sagittaria, the heterophylly seems to be due to the difference in the intensity of light in the submerged and aerial parts. More light intensity in the aerial parts favours formation of entire leaves. The floating leaves have waxy surface so

that water may not wet the surface and block stomata. The presence of mucilage on the aerial organs seems also an adaptation for protecting them from getting wet. The propagation of most hydrophtes is vegetative.

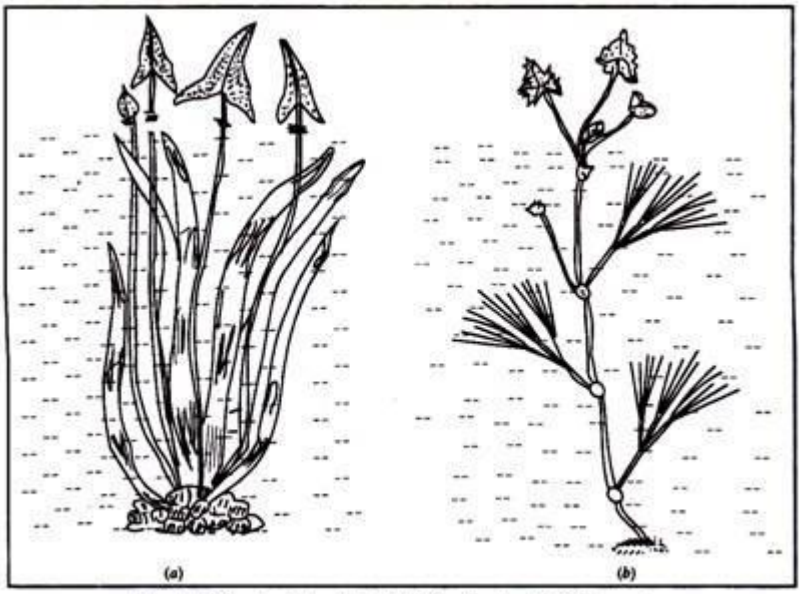

Fig. 2.5. Showing heterophylly in (*a*) **Sagittaria** and (*b*) **Ranunculus**