

a multitude of environments.

13.2 ADAPTATIONS IN HYDROPHYTES

Hydrophytes are plants that have evolved specialised adaptations to thrive in aquatic environments. These adaptations are crucial for their survival in habitats like ponds, lakes, marshes, and rivers. The unique characteristics of hydrophytes enable them to overcome the challenges posed by continuous submersion or waterlogged conditions. These adaptations can be broadly categorised into structural, physiological, and reproductive strategies.

Key Features of Hydrophytes

Root Systems: Hydrophytes often possess shallow or poorly developed root systems. Some species have specialised roots called "aerenchyma," which allow for efficient gas exchange in waterlogged soils by transporting oxygen to submerged parts of the plant.

Stems and Leaves: Many hydrophytes have hollow or air-filled stems and leaves that provide buoyancy and facilitate gas exchange. Some species exhibit reduced or no cuticle on their leaves to further facilitate gas diffusion.

Gas Exchange Adaptations: They possess specialised tissues, such as aerenchyma and lenticels, that enable efficient exchange of gases, particularly oxygen and carbon dioxide, between submerged parts and the atmosphere.

Physiological Adaptations: Hydrophytes often have adapted metabolic processes to function in low-oxygen environments. Some employ anaerobic respiration or use oxygen generated through photosynthesis in aerial parts to survive in waterlogged soils.

Reproductive Strategies: They have adapted reproductive strategies to cope with aquatic environments, including production of buoyant seeds or spores that aid in dispersal through water currents.

Tolerance to Waterlogging: Hydrophytes display tolerance to prolonged waterlogging, preventing damage to cellular structures and metabolic processes, often through the activation of specific enzymes and protective mechanisms.

Water lilies have broad, floating leaves with stomata on their upper surfaces, allowing gas exchange. They exhibit air spaces in their rhizomes and petioles, aiding in buoyancy and gas transport. Cattails have elongated leaves with stomata concentrated on their upper surfaces to facilitate gas exchange. They possess aerenchyma in their roots and stems, enabling oxygen transport to submerged tissues. Water hyacinths have spongy, air-filled tissues in their petioles and leaves, providing buoyancy and aiding in gas exchange. They reproduce prolifically with buoyant seeds that aid in dispersal. Floating pondweed exhibits reduced cuticle on its leaves and possesses aerenchyma to facilitate oxygen transport. It thrives in a wide range of aquatic habitats.

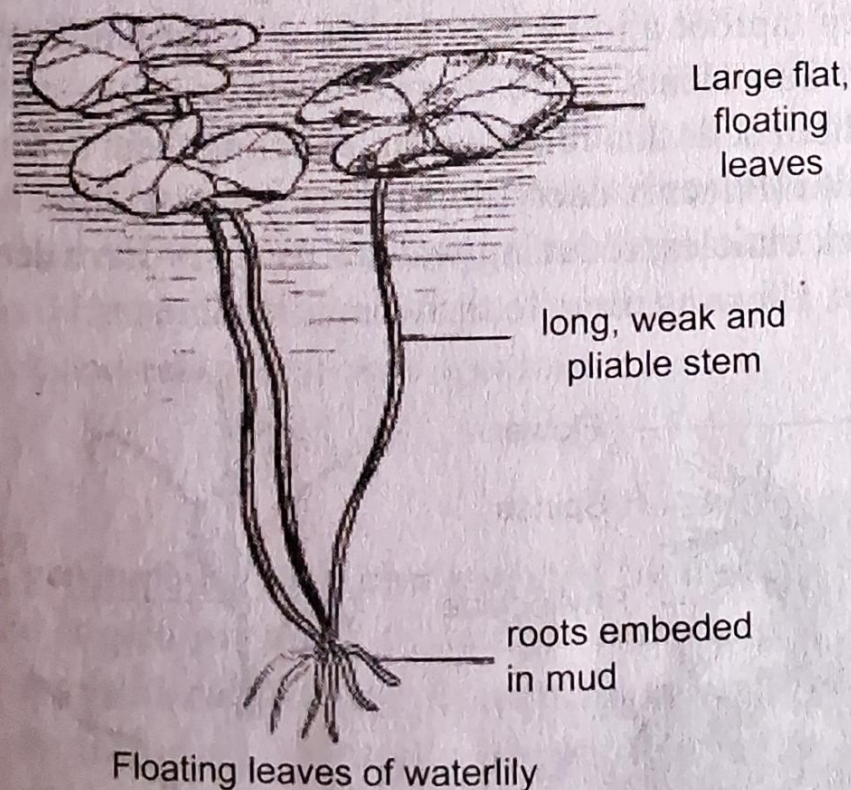


Fig. 13.1. Common adaptations in hydrophytes