I. EVOLUTION IN PLANTS: ADAPTATIONS IN LEAVES FOR MOISTURE LEVEL

Depending on available moisture in their specific habitat, plants may be described as hydrophytes, mesophytes, or xerophytes, halophytes.

These are only general ecological groupings since there is no hard and fast division between them. Many species have a wide range of

moisture tolerance. Plants have adapted to extremes in moisture level by altering their vegetative structures. All parts of the plant may be

affected, leaves, stems and roots. Some parts may even be lost or highly modified. For example, in many cacti, the leaves only grow as

spines to protect against being eaten and serve no photosynthetic function.

In this section, we will study changes in leaf structure that are adaptive for different habitats.

A. HYDROPHYTES

Hydrophytes grow as free floating or completely submerged fresh water plants. Their leaf characteristics may include:

1. a cuticle only on the upper epidermis in floating leaves and absent in submerged leaves

2. thin and ribbon like leaf shape

3. a well developed aeration system including enlarged intercellular air chambers throughout the plant

4. stomata only on the upper epidermis in plants with floating leaves and lacking in submerged leaves.

B. MESOPHYTES

Mesophytes are plants that have adapted to an environment of moderate moisture. This moisture is typical of the meadows and forests of

temperate climates. Since most vascular plants are mesophytes, their structure and adaptations are already familiar to us. Their leaf characteristics

include:

1. a thin cuticle covering the epidermis

2. an epidermis that is usually a single cell layer thick

3. stomata often present on both sides of the leaf in vertically held leaves (often only on the lower side of a horizontally held leaf)

4. a thin leaf due to a moderate amount of mesophyll.

C. XEROPHYTES

Xerophytes are plants that survive where there is a limited water supply. They are characteristic of desert or semi desert regions.

Succulents, such as cacti, are generally regarded as highly specialized xerophytes. Non succulent xerophytes are mostly grasses and

woody taxa such as the evergreens. Their characteristics include:

1. a thick cuticle and thick epidermal cell walls

2. sunken stomata with an increased mesophyll layer containing large water storage cells

3. thick coats of epidermal hairs on either or both leaf surfaces

4. small leathery leaves

TABLE ENVIRONMENTAL ADAPTATIONS IN ANGIOSPERM LEAVE

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| --- | --- | --- | --- | --- |
| EXAMPLE | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| ADAPTATION | Hydrophyte | Mesophyte | Xerophyte | Halophyte |
| Habitat |  |  |  |  |
| Thickness of Cuticle |  |  |  |  |
| Number and Location of Stomates |  |  |  |  |
| Number of  Air Spaces |  |  |  |  |
| Amount of Mesophyll |  |  |  |  |
| Labelled  Drawings |  |  |  |  |