



## Lichen and Mycorrhizae

### 10.1. LICHEN

Lichens are a group of composite plants made out of an intimate association of a fungus with a photosynthetic partner usually either a green algal species or a cyanobacterium. This intimate association of these two microorganisms (a fungus and an alga) results in the formation of a macroorganism—the lichen—which is different from the morphology of either of the partners. Some workers called lichen as an idyllic consortium. It is a good example of symbiosis where the photobiont (the photosynthetic partner) and the mycobiont remain in an intimate mutualistic symbiotic relationship. When the photosynthetic partner is a green algal species it is called as **phycobiont** and when it is a cyanobacterium, it is called **cyanobiont** but the fungal partner is called the **mycobiont**.

#### 10.1.1. Occurrence

Lichens are the first examples of symbiosis. Lichen term was first introduced into the Greek literature in about 300 BC by **Theophrastus** to describe outgrowth from the branch of olive trees.

The symbiotic relationship of the two components of a lichen makes it to live in a variety of habitats and climatic conditions all over the world including extreme environments. They are not only found in diverse climates but they also grow on the diverse substrates. They are found from the sea level to high alpine elevations. They are abundant on bark of trees, leaves, mosses, on other lichens in rain forests and in temperate woodlands. They live in harsh environments like deserts and polar regions, on exposed surfaces like bare rocks, walls, roofs, tree branches, man made substrates like glass, metals, etc. Moreover, they occur virtually in every pioneer terrestrial habitat from Arctic and Antarctic to tropical areas and desert areas where they are able to form long lived stable communities. Besides, within a climatically uniform region each particular substrate tends to assume eventually a characteristic and remarkable uniform lichen community.



There are around 20,000 species of lichen, under nearly 5000 genera and still more lichens are to be discovered.

Depending on the types of substrate, the lichens are called differently as given below :

**Lichens Types on Different Substrates**

Called	Substrate on which grow	Example
Corticolous	Bark of Tree	<i>Usnea</i>
Follicolous	Leaves	<i>Strigula</i>
Saxicolous	Rocks	<i>Verrucaria</i>
Terricolous	Soil	<i>Bryoria</i>
Muscicolous	Moss	<i>Cladonia</i>

### 10.1.2. Classification of Lichens (Types of Lichens)

Lichens are classified (or grouped) on the basis of (i) habitat, (ii) the nature of mycobiont, (iii) growth form or thallus structure and (iv) distribution of algal component in the thallus.

- (a) **On the basis of habitat.** As already given above, the lichens are—corticolous (on bark of trees), Terricolous (on soil), Follicolous (on leaves), Saxicolous (on rocks), Lignicolous (on wood), Muscicolous (on moss) etc.
- (b) **On the nature of fungal partner.** Lichens are grouped as (i) Ascolichen—if the fungal partner is an ascomycetae member, it may be again sub-divided into gymnocarpae (if the fruiting body is an apothecium), or it may be pyrenocarpae (if the fruiting body is a perithecium), (ii) Basido-lichen—when the mycobiont is a member of Basidiomycetes.
- (c) **Based on distribution of algal component in the thallus.** Depending on the distribution of phycobionts in the thallus it may be—(i) Homoisomorous type—when both partners are uniformly distributed or (ii) Heteromorous type—when the algal cells form a distinct layer and fungal component form other layers.
- (d) **Based on thallus structure.** Basing on the structure of the thallus lichens may be—
  - (i) *Leprose lichen*—when minute scales are attached superficially to the substratum (e.g. *Lipraria*).
  - (ii) *Crustose lichen*—crust like, closely attached to the substratum at several points (e.g. *Graphis*).
  - (iii) *Foliose lichen*—the thallus is leaf like, lobed, attached to the substratum at one or more points (e.g. *Parmelia*).
  - (iv) *Fruticose lichen*—the thallus is branched, erect or pendulous with bushy appearance, attached to the substratum by a basal disc (e.g. *Usnea*).

### 10.1.3. Growth Forms and Morphology of Lichens (Fig. 10.1 A, B, C)

#### A. Growth Forms

Lichens are found in a wide varieties of shapes and forms. The vegetative body of lichen is known as the thallus. Thallus is the most prominent and morphologically visible portion of lichen and