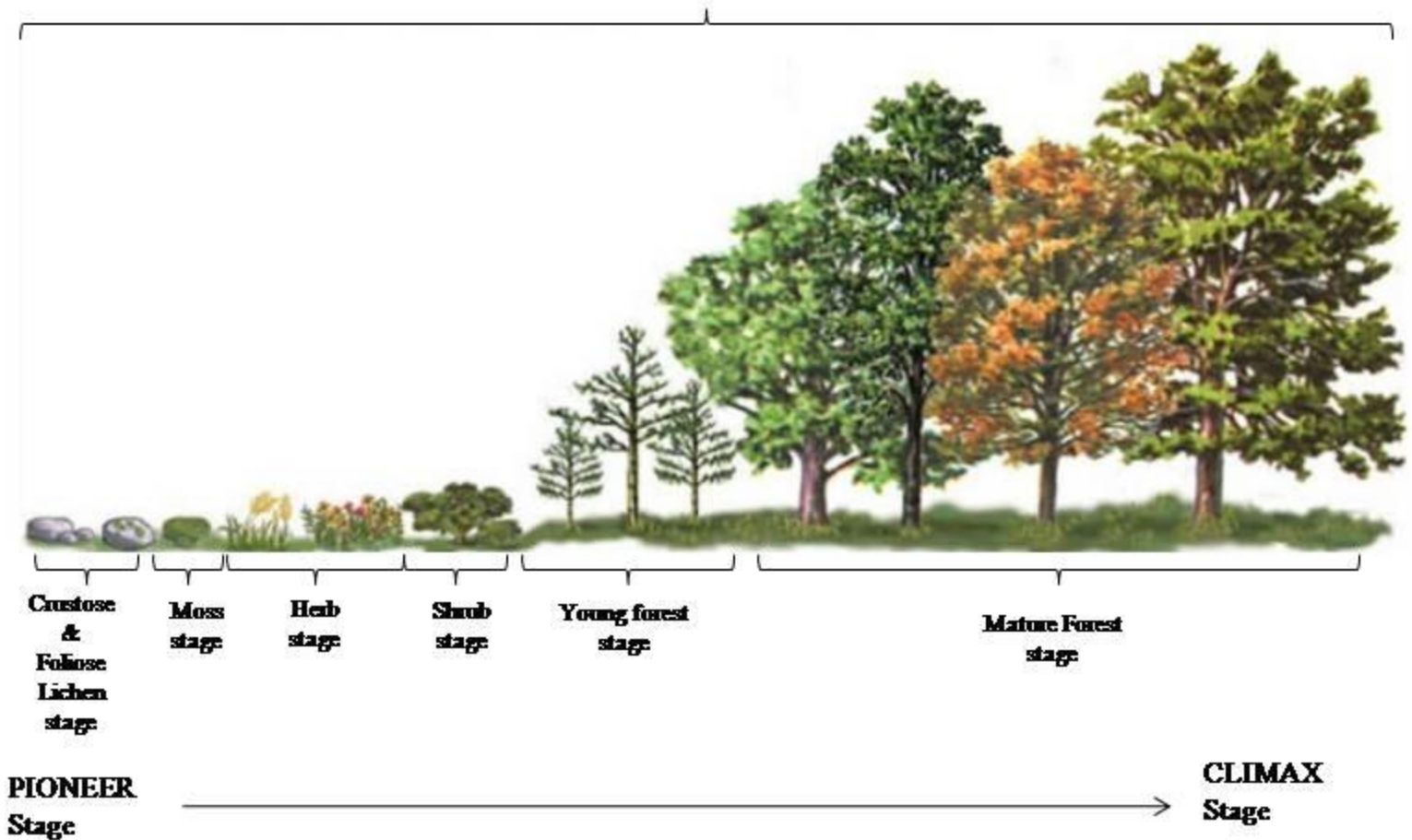


LITHOSERE



A Schematic diagram showing various stages of Lithosere. Stage 1- Crustose & Foliose Lichens (Pioneer stage), 2- Mosses, 3- Herbs, 4- Shrubs, & 5- Forest (Climax stage).

LITHOSERE

It is a type of xerosere (where the original substratum is deficient in water) that originates on bare rock surface. The pioneers that colonize first the bare rock surfaces are crustose lichens, and through a series of successive seral stages the succession terminates into a balanced state, a forest constituting the climax community. It is an autotrophic and primary succession. Both plant and animal communities change during the succession. As the changes in plant communities are more obvious, therefore successional stages are named after the plant species dominating the community at each stage.

Successional stages of lithosere are as follows:

CRUSTOSE LICHEN STAGE: The bare rock substratum lacks in moisture and organic matter, and temperature is very high in absence of moisture. The crustose lichens (e.g. *Rhizocarpon*, *Rinodina*, and *Lecanora*) are pioneers as they have ability to colonize such harsh environments. They invade rock surfaces as windblown soredia (the reproductive structures). They form thin crust that intimately adheres to the rock surface. They take moisture from air, grow slowly by forming a crust on the rock surface. Thin crust of these lichens accumulate little moisture during short wet period and the respiratory CO_2 combines with water to form carbonic acid, a weak acid and fungal component also secretes certain organic acids that promote weathering of rocks, that further promotes penetration of fungal hyphae deeper into the rock surface and so accumulation of more moisture. The dead organic matter of lichens become mixed with the weathered mineral matter of the rocks, thereby beginning soil formation process.

FOLIOSE LICHEN STAGE: The substratum modified by crustose lichens becomes suitable for colonization by foliose lichens e.g. *Parmelia*, *Dermatocarpon* etc. which have large leaf-like thallus. They can absorb and retain more water and grow faster than crustose lichen. They further hasten the weathering of rock by excreting organic acids and penetration of rhizines. They provide more dead organic matter and, humus that get mixed with weathered mineral matter, resulting in formation of thin layer of soil on the rock surface.

MOSS STAGE: The above modified substratum becomes suitable habitat for growth of some xerophytic mosses e.g. *Polytrichum*, *Tortula*, and *Grimmia*. The mosses are able to grow in this thin layer of soil as thin layer of soil is able to retain moisture, provide nutrients and substratum for rhizoid penetration. Mosses provide more dead organic matter upon their death and decay, and also promote weathering of rock surface, thereby increasing soil thickness.

HERB STAGE: The above modified substratum (thicker soil with more moisture, nutrients and organic matter) becomes suitable habitat for growth of some herbaceous weeds mostly the annuals, in turn followed by biennials and then perennials. Some grass species constituting this stage are: *Agrostis*, *Aristida*, *Festuca*, *Andropogon*, *Poa*. They have shallow but profuse fibrous root system, which upon death and decay add large amount of dead organic matter and, humus into the soil, further increasing thickness of the soil.

SHRUB STAGE: When the soil becomes sufficiently thick on the rock surface or in the crevices, the habitat becomes suitable for growth of shrub species like *Rhus*, *Abutilon*, *Eupatorium* etc. and They have more biomass and so add more dead organic matter into the substratum, as leaf litter. They have deep root system absorbing nutrients and water from deeper layers, promoting weathering of rock surfaces. Their growth further increases soil thickness, nutrients, organic matter and moisture in the substratum.

FOREST STAGE: The modified substratum becomes favourable for the growth of tree species. Some xerophytic tree species start invading and growing in the modified habitat and then slowly more tree species invade and finally results into a climax - forest community. Some common tree species at this stage in moist deciduous forest are *Quercus sp.*, *Acer sp.*, *Pinus sp.*, etc.

Some important questions on the topic

1. **What does the set-up illustrate?**
2. **Name the pioneer stage.**
3. **Explain the role of crustose lichens in the given set-up.**
4. **Mention sequential stages in the given set-up and give examples of the plant species dominating at each stage.**
5. **Briefly explain any two functional changes observed in the given set-up.**
6. **What is ecological succession?**
7. **What are pioneer species and discuss about their importance?**
8. **What is the importance of ecological succession?**
9. **"Hydrosere and xerosere are autogenic type of succession" Comment.**
10. **Briefly discuss about the characteristic features of climax community.**
11. **Differentiate between primary and secondary ecological succession.**
12. **Name the two concepts explaining the formation of stage marked 5.**
13. **What would happen if fire devastate the stage marked 5?**