

Dr. Namita Kumari
Department of Botany
Magadh Mahila College
Patna University, Patna

Environmental or Ecological Factors 1

- The environmental factors which influence the life and development of plants and organisms are grouped into four main classes which are as follows-
- **1.Climatic factors** (related to aerial environment),
- **2.Edaphic factors**(related to soil conditions),
- **3. Physiographic (topographic factors)**, and
- **4. Biotic factors**(influence of living organisms).

EDAPHIC FACTORS

2

- The soil is one of the most important ecological factors called edaphic factor. It is the most characteristic feature of the terrestrial environment. It is the reservoir of biogenic salts and minerals which are essential for the plants. It is not only factor of the environment but also a product of the organic activities causing the biological withering of rock.
- Edaphic factors are those which are dependent on the soil as such- on soil constitution, soil water, soil air, soil organisms etc. Soils at different places vary considerably in their structure, components and properties. These differences in the soils are often largely responsible for differences in vegetation within the same climate and region.
- Soil is a stratified mixture of inorganic and organic materials.

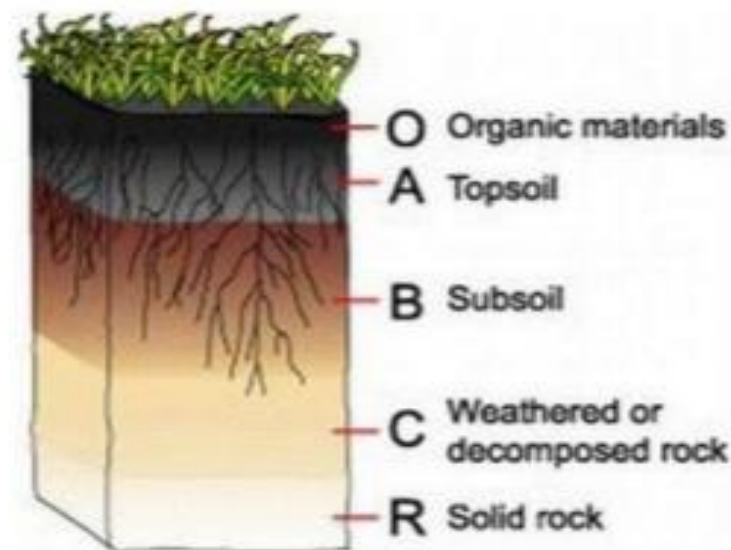
Soil profile

Vertical section of earth crust (~6 feet) – soil profile.

- Structure, thickness, consistency, texture, porosity, colour, chemical composition.
- Soil profile vary from place to place
- Depends on climate, vegetation and parent rock
- Top soil thicker in forest

Layers of soil is Horizons- 6 horizons.

- 1) O-horizon (organic horizon or litter zone)
- 2) A-horizon (top soil)
- 3) B-horizon (sub soil)
- 4) C-horizon (weathering rock)
- 5) D-horizon (weathering rock)
- 6) R-horizon (bed rock)



LAYERS OF SOIL



O HORIZON
Loose and partly
decayed organic
matter

A HORIZON
Mineral matter
mixed with some
humus

E HORIZON
Light colored
mineral particles,
zone of eluviation
and leaching

B HORIZON
Accumulation of
clay transported
from above

C HORIZON
Partially altered
parent material

R HORIZON
Unweathered
parent material

Layers of a Soil Profile

Humus

Topsoil

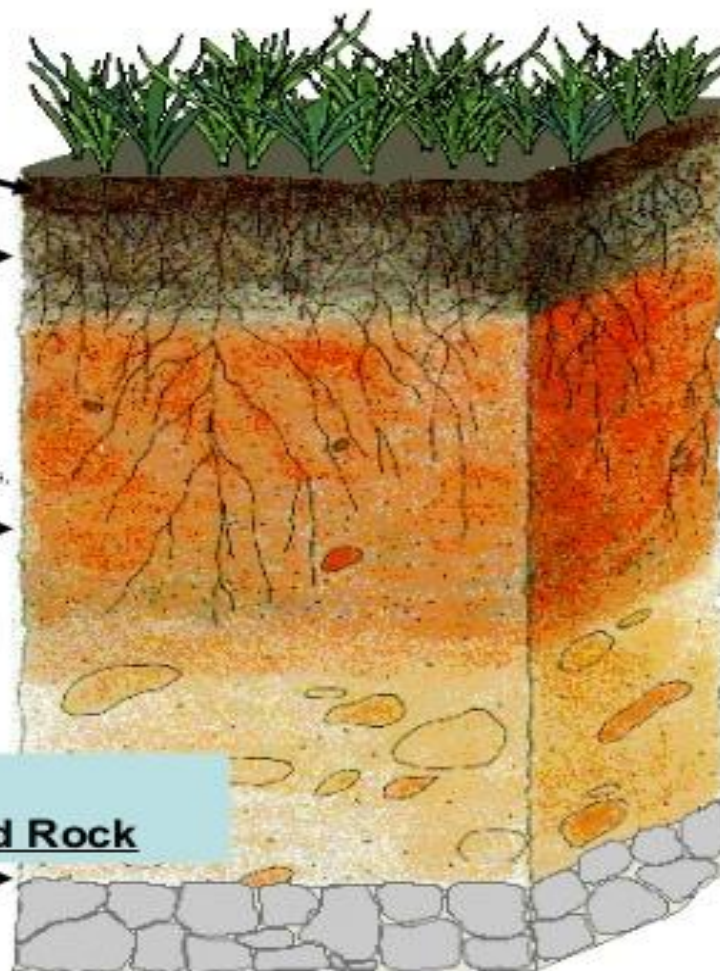
Humus and minerals gives the topsoil a rich brown color.

Subsoil

Lighter color with less humus and minerals.

Bedrock

Mostly rocks.
Also called **Solid Rock**



i) Soil moisture

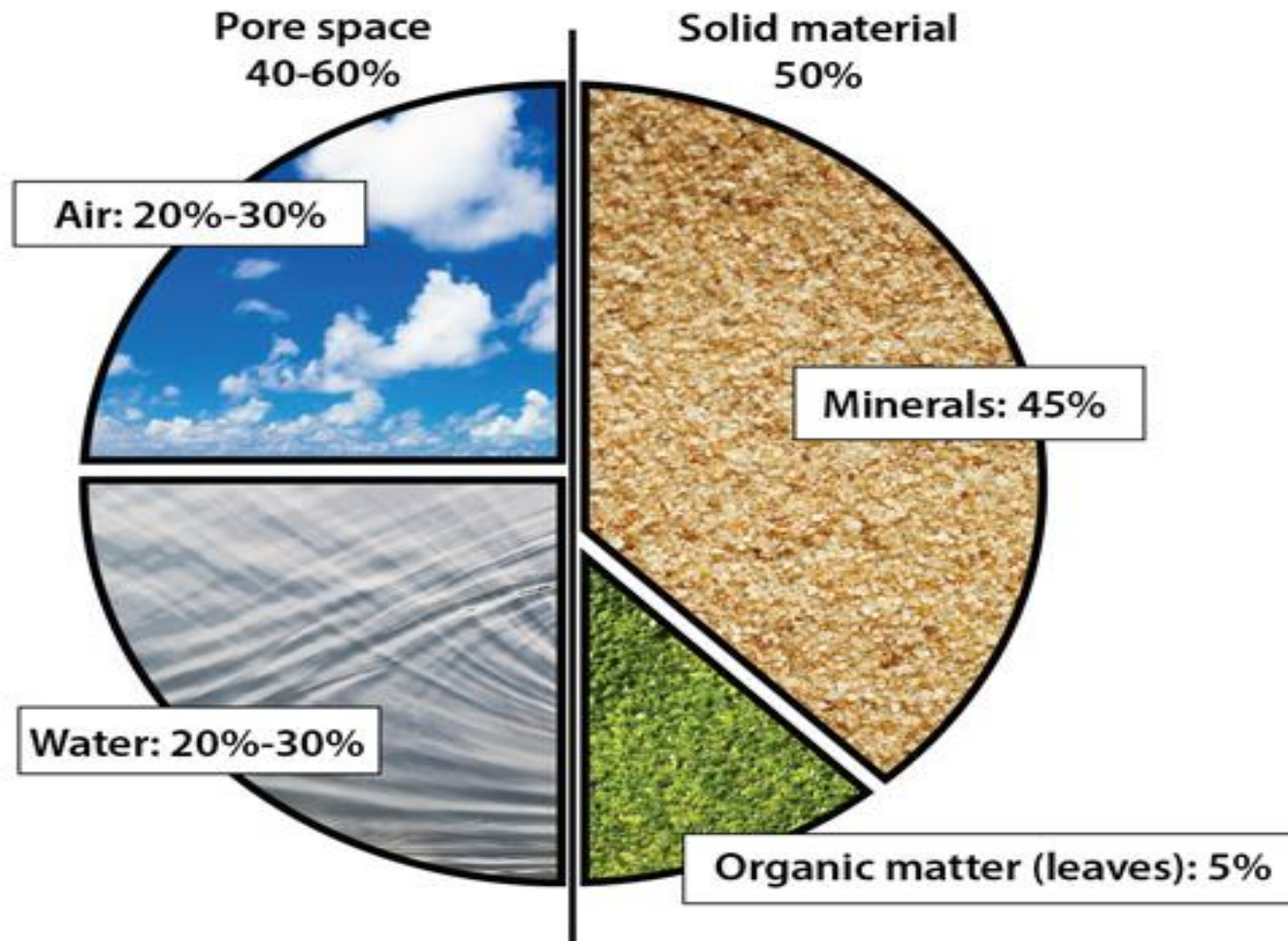
6

- The important edaphic factors which affect the vegetation are as follows – Soil moisture, Soil reaction, Soil nutrients, Soil temperature, Soil atmosphere, and Soil organisms.
- i) Soil moisture- Plants absorb a small quantity of rain water and dew directly but they take a large quantity of water from the soil. Water of the soil which is easily available to the plant is termed as **chresard**.

Soil's available water is the factor responsible for local differences between plant communities. Heavily water logged soil is injurious for the growing plants because it reduces the soil aeration. Low water content in the soil is also injurious because it causes either temporary or permanent wilting of plants.

Soil contains-----

7



ii) Soil reaction

8

- ii) Soil reaction- The soil may show acidic, alkaline or neutral reactions. The growth and productivity of many species of plants are critically related to soil acidity. Species of Rhododendron, Cranberries are acid loving. Most of the field crops, such as barley, maize, soybeans, tomato, rye, potato flourish in slightly acidic soils. Many ferns and beech trees thrive best in slightly alkaline soils.

iii) Soil nutrients

9

- iii) Soil nutrients- Normally, inorganic solutes are absorbed by the plants in the ionic forms. Different species of plants require them in varying quantities.

In saline soil where the percentage of salt in the soil is high only **halophytes**(salt loving plants) grow.

Some plants require lime and grow in calcium rich soils. Such plants are called **calcicoles** or **calciphytes**.

Some plants do not thrive well when they grow in calcium rich soil. These species are called **calcifuges** or **oxylophytes**.

Humus, a dark substance formed by partial degradation of dead organic remains is main source of mineral and organic nutrients of green plants.

- Iv) Soil atmosphere- In the soil, the spaces left between soil particles are called pore spaces. These spaces contain air. Soil air contains slightly lower proportion of oxygen and higher one of CO₂ than atmospheric air. Water logged soil are deficient in oxygen.

Normally, plenty of oxygen is necessary for the life of micro-organisms and other soil inhabitants.

Oxygen is also necessary in the respiration of underground parts of higher plants.

It is also an important factor in seed germination, which requires large amount of oxygen for respiration.

v) Soil organisms

11

- v) Soil organisms- The plants, animals and microbes inhabiting the soils show marked effects on the soil fertility. Decomposing agents, such as, bacteria, fungi and many others convert dead organic matters in humus, free organic compounds and organic ions and thus make the nutrients available to the plants.

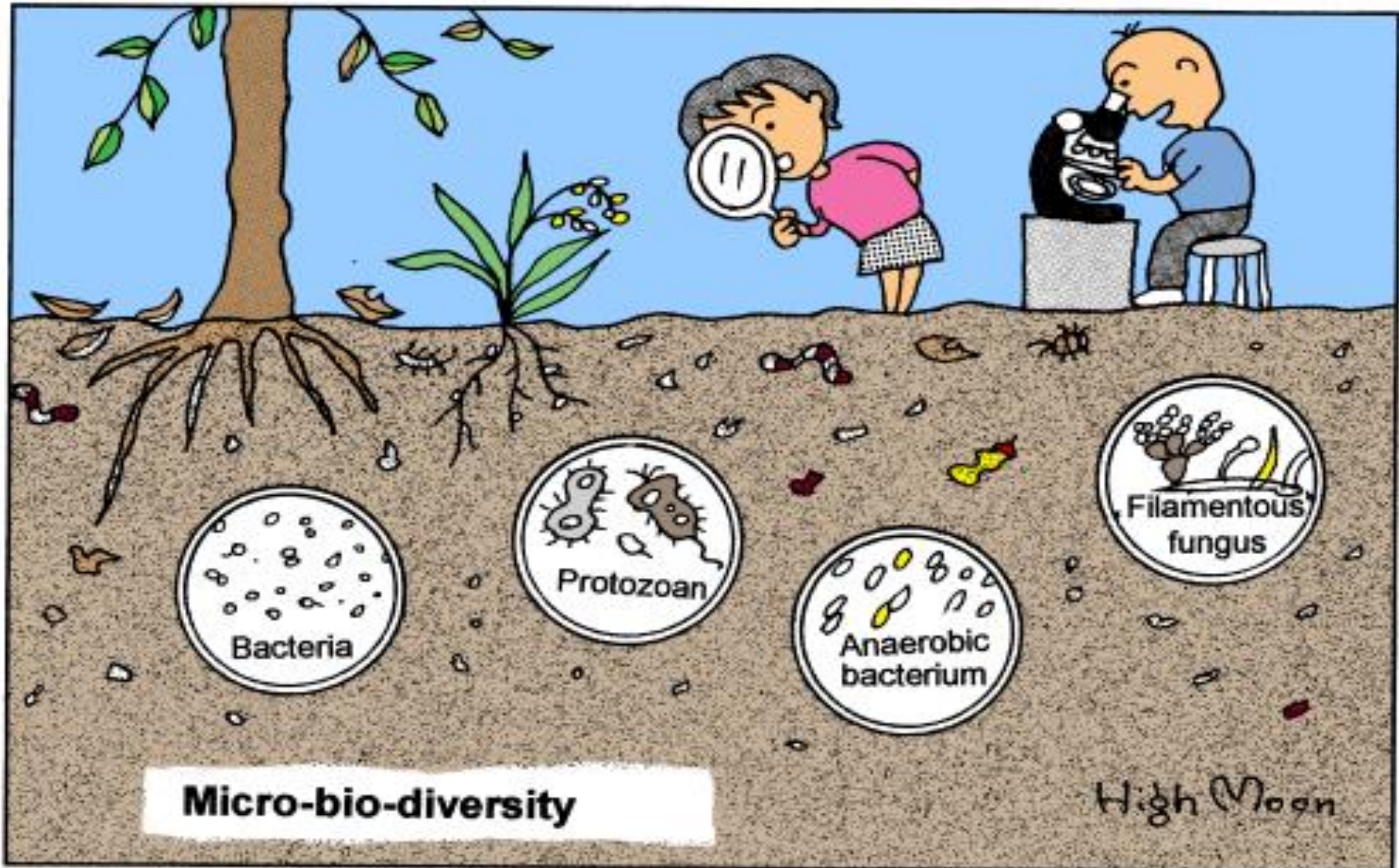
Some of the bluegreen algae, like Nostoc, Anabaena, Cyndrospermum are beneficial to the higher plants because they fix atmospheric nitrogen into nitrogenous compounds that are utilized by the higher plants.

The animals of burrowing habit also play important role in the soil by turning over the soil. Earthworms increase the fertility of the soil by adding excretory matters to it and also by making it loose.



Different bacteria in the soil 13





Note: Many kinds of microbes act in decomposition of organic matter.



THANKS