

Hello students. I am Linette

Noronha. Today I'm going to help you understand and gain knowledge about microbial succession in decomposition of plant organic matter.

This topic deals with.

the concept of decomposition,

the concept of microbial succession,

the stages in the decomposition of plant organic matter

and concept of composting.

From this presentation, the students will be able to

understand the role of microbes

in the decomposition of organic

matter and elucidate how each type of microorganism involved

in the process

paves the way for the other types to grow and carry out

their metabolic activities

thus, accomplishing decomposition of organic matter.

Decomposition of organic matter that is of dead plant and animal

remains in soils is an important process in any ecosystem.

Decomposer organisms feed on the organic matter

and break it down into its simplest components.

As organic matter is decomposed, water, carbon dioxide and nutrients are released and are made available for plants to use for their growth.

The process of decomposition can be explained as follows:

In the first stage of decomposition, when plant residues are returned to the soil, the various organic compounds in the plant residues undergo decomposition.

In the second stage, called biotransformation, the complex organic molecules of dead plant materials undergo physical breakdown and biochemical transformation into simpler organic molecules.

In the final stage, successive decomposition of dead plant materials results in the formation of a more complex organic matter called humus.

Decomposition of plant matter occurs in many stages.

The process is dependent on microorganisms, called decomposers to break down complex organic matter into

simple organic matter.

There are many types of decomposers that carry out this process in a sequential manner, phenomenon called microbial succession.

What is microbial succession?

It is the initial microbes that change the environment so that other microorganisms can thrive.

The community begins with relatively few pioneering plants and animals and develops through increasing complexity until it becomes stable or self perpetuating.

Stages in the decomposition of plant organic matter.

Decomposition of plant matter occurs in many stages:

Leaching is the first stage which begins with leaching by water. The most easily lost and soluble carbon compounds are liberated in this process.

This stage is followed by fragmentation, which involves the physical breakup of plant material into smaller bits by the detritivores, the soil invertebrate fauna, and parasitic life forms such as insects and fungi.

This is followed by biotransformation wherein, plant

organic matter made up of cellulose, hemicelluloses  
microbial products and lignin, undergoes chemical alteration by  
microbes, forming humus.

Composting is a natural biological process carried out  
under aerobic conditions.

In this process, various microorganisms, including  
bacteria and fungi,  
breakdown organic matter into simpler substances.

Composting biodegrades organic waste such as food waste,  
manure, leaves, grass trimmings.

paper, wood, feathers, crop residue, etc and turns it into  
a valuable organic fertilizer.

As in the natural decomposition of plant organic matter,  
microbial succession is also observed during composting.

Composting proceeds through three major phases.

In the Mesophilic phase,  
decomposition under moderate  
temperatures is carried out by  
mesophilic microorganisms which include the organic acid  
producing Lactobacillus species and Acetobacter species.

This phase is followed by the Thermophilic phase.

As temperature rises,decomposition is carried out by thermophilic bacteria, such Bacillus species, Actinobacteria which become dominant. In the last phase called the Maturation phase, the supply of high energy compounds reduces and temperature starts to decrease and the mesophiles once again predominate.

To summarize what we have learnt:

Decomposition of organic matter that is dead plant and animal remains in soils is an important process in any ecosystem.

Decomposer microorganisms feed on the organic matter and break it down into its simplest components, forming humus like material.

As organic matter is decomposed, water, carbon dioxide and nutrients are released and are available for plants to use for their growth.

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fertilizer called compost.