ECOSYSTEM
DECOMPOSITION

DECOMPOSITION :

- **Decomposition (Formation of Humas) :** Decomposers break down comlex organic matter into inorganic substance like carbon dioxide, water and nutrients and the process is called decomposition. Dead plant remains such as leaves, bark, flower and dead remains of animals, including fecal matter, constitute **detritus**, which is the raw material for decomposition.

❖ **Detritus involves two types :**

(A) Above ground detritus : (Plant litter, dead plant parts & animal parts excretory substances).

(B) Below ground detritus : Dead roots of plant, Dead animals in soil.

The important steps in the process of decomposition are **fragmentation, leaching, catabolism, humification and mineralisation.**

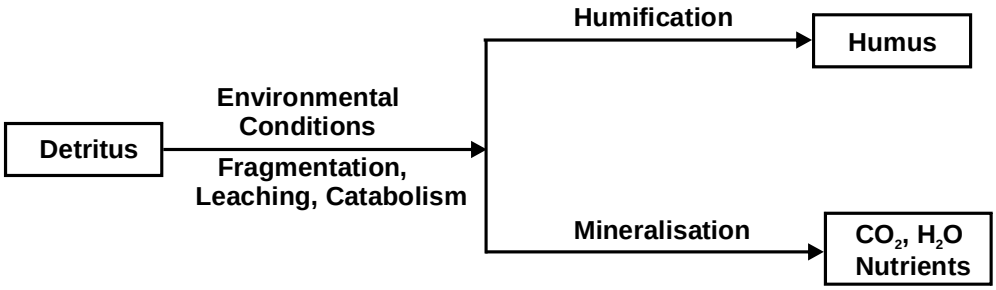

Fig: Processes involved in decomposition of detritus

- Detritivores (eg., earthworm) break down detritus into smaller particles. This process is called **fragmentation**. By the process of **leaching**, water soluble inorganic nutrients go down into the soil horizon and get precipitated as unavilable salts. Bacterial and fungal enzymes degrade detritus into simple inorganic substance. This process is called as **catabolism.**
- It is important to not that all the above steps in decomposition operate simultaneously on the detrius. **Humification and mineralisation** occur during decomposition in the soil. Humification leads to accumulation of a **dark coloured amorphous** substance called **humus** that is highly resistant to microbial action and undergoes decomposition at an extremely slow rate. Being colloidal in nature it serves as a reservoir of nutrients. The humus is further degraded by some microbes and release of inorganic nutrients occur by the process known as **mineralisation.**
- Decomposition is largely an oxygen-requiring process. The rate of **decomposition is controlled by chemical composition of detritus** and **climatic factors**. In a particular climatic condition, decomposition rate is **slower** if detrius is **rich in lignin** and **chitin** and **quicker**, if **detritus is rich in nitrogen** and **water-soluble substances like sugars**.
- **Temperature** and **soil moisture** are the most important climatic factors that regulate decomposition through their effects on the activities of soil microbes. Warm and moist environment favour decomposition where low temperature ($< 10^{\circ}C$) and an anaerobiosis inhibit decomposition resulting in build up of organic materials.
- Decomposition requires years at very high altitude or lattitudes. Rate of decomposition is low in prolonged dry soil like in tropical desert.
- The actual rate of decomposition depands on **environmental conditions** and **detritus quality.**
- **Nutrient Immobilisation -** In the process of decomposition, some nutrients get tied up with the biomass of microbes and become temporarily unavailable to other organisms. Such incorporation of nutrients in living microbes (bacteria and fungi) is called **nutrient immobilisation.**
- Nutrients gets immobilized for variable periods and gets mineralised later after the death of microbes. This immobilization **prevents nutrients from being washout form the ecosystem.**

❖ **Two types of Humus -**

(i) **Mor (Coarse terxtured humus)-** It is raw humus and is formed in acidic soil (PH - 3.8 4.0)

in which decomposition of litter is slow because it has less number of decomposer organism.

(ii) **Mull –** This is completely decomposed litter. i.e., humus because rate of decomposition is fast due to high PH of soil. **(Best PH of the soil 5.5 to 6.5)**