



FACTORS AFFECTING DECOMPOSITION OF WASTE

Biological Science

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ABSTRACT

Decomposition of organic matter is very important part of nature's life cycle. It is being done from the time when life first came to our planet. This oldest process is natural way of breaking the organic matter and mixing it with the soil where it can provide some vital nutrients to the soil. In this paper, we will discuss factors that affect this natural process of decomposition. The process of decomposition is responsible for degradation of waste matter and if it is affected then it will be huge problem for the society and in turn to the nature. Thus, these factors must be identified and take care of before it gets too complicated for the nature and us.

KEYWORDS:

Degradation, Organic matter, Decomposition, nature, Life cycle

I. INTRODUCTION

In recent time, there is huge focus on waste management and people are becoming aware of the ill effects of waste matter on our life. It is very important that this waste should be degraded and return to the nature in order to get the nature's life cycle complete. However, with urbanization, the natural cycle of decomposition has been affected and its effects are showing in the society.

The decomposition process is degradation of organic matter into simpler things and it is very complex and gradual process. It uses both chemical and biological methods for degrading the organic matter. The organisms mostly carry it out and microorganisms present in nature. Along with these organisms, some chemical reactions take place in the nature between the elements like oxygen, nitrogen present in the nature. Thus, it is necessary to maintain correct balance in the nature for decomposition to take place in natural and correct way. The effective decomposition requires aeration, moisture, particle size, sufficient source of carbon and nitrogen. With all these parameters getting affected by the human interference, the decomposition process is not completed and waste remains in the nature. This half degraded waste then have harmful effects on humans, animals and plants.

There are some byproducts of decomposition process like biogas, compost etc. These products can be used for different purposes. But to form these products decomposition process should not be affected and carried out in natural way.

II. WASTE MANAGEMENT

Waste is nothing but the substance or object, which is discarded by its owner. It can be classified broadly, as plant-based waste, chemical waste, and biological waste. These waste objects are put together and are carried as pile from its origin and dumped in the vacant place or thrown into water bodies in case of chemical liquid byproducts. This kind of waste management strategy is not recommended; as such, disposal of waste in landfill or water bodies is very hazardous to the environment. Thus we should try to reduce waste and apply other strategies so that amount of waste going to the landfill will gradually reduce. It is very difficult task to reduce waste as with population explosion and economic growth the amount of waste has also increased in recent times. The composition of waste also changes such as geological location, cultural and dietary habits, standard of living etc because of several factors. With such variation in the composition of the waste, it is difficult to apply single strategy of waste management everywhere. Thus, it is necessary to deal with the waste based on its composition.

In this paper we were discussing decomposition of organic waste and how it is important for the natural life cycle. The waste substance that is created by one process or organism can be useful for the other. Thus this cycle of creation and decomposition continues until the substance is turned back to its simpler form and assimilated in the soil. This cycle is strategy of the nature to ensure the stability of the world and its

resources. The waste production is clear issue but its decomposition has also became huge problem and it is due to lot of factors that the rate of decomposition is reducing and creating unbalance in the nature.

III. DECOMPOSITION

As we mentioned the decomposition, process is very slow and takes time. It is natural process and it is necessity of the nature to get back the nutrients through this process. Decomposition process can be biotic or abiotic. In biotic process, the waste substance is degraded by natural process using microorganisms and other agents like oxygen, water, nitrogen etc. but abiotic process takes place by use of chemical or physical process. Abiotic decomposition is mostly hampered by problem in chemical or physical process. However, biotic process has many factors, which can affect it. Several factors are listed below.

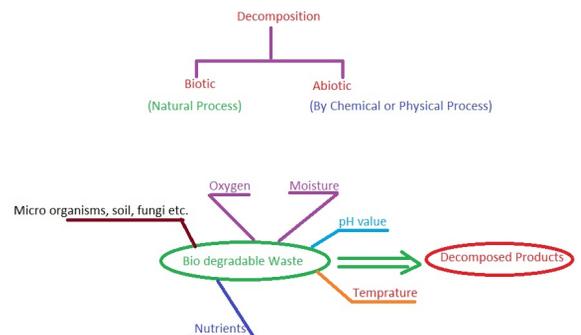


Figure 1:- Decomposition Process

A. Biological Activity

Soil, which is biologically active, has better rate of decomposition. The biological activity is carried out by bacteria, fungi and other microorganisms present in the soil. Thus with active organisms the decomposition rate will be high and this soil is very healthy and thus if we improve soil quality we will definitely get faster decomposition rate.

B. Oxygen Level

Decomposition can be anaerobic or aerobic depending on the oxygen levels. Anaerobic decomposition takes place in the absence of oxygen or in less oxygen while aerobic decomposition requires oxygen. Aerobic decomposition is mostly done by organisms in the soil and they need oxygen to live and carry out decomposition process. This oxygen comes from air above soil and if soil is loose there is much space to trap oxygen. This oxygen is used by organisms to decompose faster. But if soil is tight there is not much space for oxygen to penetrate thus reducing biological activity which leads slower decomposition rate and also develops foul odors.

C. *Moisture Level*

Moisture in the soil plays important role in decomposition rate. The wet soil has gaps filled with water. Because of which oxygen is not trapped which is required by the organisms in the soil. But completely dry soil will also make decomposition slower as organisms also require water to survive like any other living creature. Thus, with less water, they cannot survive and without sufficient number of organisms, the decomposition rate becomes slower. Thus, soil with both dry and wet periods has very good rate of decomposition.

D. *Soil pH*

Soil pH determines the acidic or alkaline nature of the soil. Acidic soil has low pH while alkaline soil has high pH value. Decomposition rate drops in acidic soil. This is because the organisms in the soil get affected when soil pH drops below 6. This leads to less biological activity and hence slow decomposition.

E. *Temperature*

At higher temperatures, the organisms are very active and their population increases significantly. Thus with increased temperature decomposition rate increases and with cold winters decomposition rate decreases

F. *Nutrients*

Along with organisms, the soil must have sufficient amount of the nutrients to carry out decomposition. The main nutrients are carbon, nitrogen. Organisms require these nutrients to decompose the organic matter. Thus, soil rich in nutrients will have better decomposition rate.

There are some other factors that affect decomposition rate like chemicals dumped by the factories and big companies. When these chemicals get mixed with the soil they kill the organisms in the soil and also change the pH level of soil. This leads to less biological activity and thus slow decomposition.

Decomposition rate also depends on the structure and chemical composition of the substance. Organic waste can be divided into biodegradable matter and non-biodegradable matter. Biodegradable matter like vegetable waste gets decompose easily and thus its decomposition is fast. With non-biodegradable matter, the decomposition is not easy. The aluminum can, plastic bags are some of the example of non-biodegradable matter. These substances take very long like hundreds of years to decompose. Some of this matter may not decompose at all. In such waste remains as it is in the nature and can cause harmful effects on the environment.

CONCLUSION

Thus to get better decomposition rate, it is necessary to maintain the soil composure and its quality. Also companies should avoid dumping their chemical waste in the landfills so that it will not affect the soil pH and organisms in it. The process of decomposition is very necessary to maintain balance of the nature. And hence we need to see that our actions do not interfere with the nature's cycle.

REFERENCES

- [1] F. Stuart Chapin, III, Pamela A. Matson, Harold A. Mooney, "Principles of Terrestrial Ecosystem Ecology".
- [2] AWWA Research Foundation, "Factors Affecting Disinfection By-product Formation During Chloramination"
- [3] Edited by Francois Buscot, Ajit Varma, " Microorganisms in Soils: Roles in Genesis and Functions".