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Bioremediation

Rajshri Shinde[1]. Sujata Bankar[2], and Monika Naphade[1]
[1]Ph.D Scholar, Guru Kashi Univesity ,Bathinda (Panjab)
[2]Assistant Professor, S.C.S.P.A COA, Ashti ,Beed, (M.S.)

SUMMARY

Continually increasing mankind activities including farmers agricultural operation, urban, or industrial are a major source of environmental pollution. Toxic metal pollution of waters, air, and soils is one of the potential problems, which is an mountains for scientists how to handle this problem that has threatened the ecosystem. To tackle this, conventional remediation approaches have been used, which, however, do not provide acceptable solutions. The development of an alternative remediation strategy for the abatement of a contaminated medium is important for environmental conservation and human health. Bioremediation, an attractive and novel technology, is a multidisciplinary approach that uses biological systems to degrade or transform and or to rid the soil and water of pollutants. This technology involves the use of plants (phytoremediation), plant–microbe interactions (rhizoremediation), and microbial communities involving stimulation of viable native microbial population (biostimulation), artificial introduction of viable population (bioaugmentation), bioaccumulation (live cells), and use of dead microbial biomass (biosorption) to clean up the contaminated sites. Bioremediation is simple, can be applied over large areas, environmentally friendly, and inexpensive. The use of genetic engineering to further modify plants for uptake, transport, and sequester metal opens up new avenues for enhancing efficiency of phytoremediation. So here elobarating about Bioremediation process singly.

INTRODUCTION

Bioremediation is a process used to treat contaminated media, including water, soil and subsurface material, by altering environmental conditions to stimulate growth of microorganisms and degrade the target pollutants. The environmental problem due to heavy metal accumulation can be rectified by bioremediation. It was invented by George M .Robins. microbes are useful in assisting reclamation of sites polluted to harmless chemicals, heavy metals cannot be destroyed. Biological treatment is a similar approach used to treat wastes including wastewater, industrial waste and solid waste. Also, for the process of biodegradation ,for degradation of pollutant there should be metabolic capacity in microbial population, an environment with the suitable growing conditions for the microbes, and the right quantity of nutrients and contaminants. The biological processes used by these microbes are highly specific, therefore, many environmental factors must be taken into account and regulated as well. Thus, bioremediation processes must be specifically made in accordance to the conditions at the contaminated site. Also, because many factors are interdependent, micro-scale tests are usually performed before carrying out the procedure at the contaminated site. However, it can be difficult to extrapolate the results from the small-scale test studies into big field operations. In many cases, bioremediation takes more time than other alternatives such as land filling and incineration.

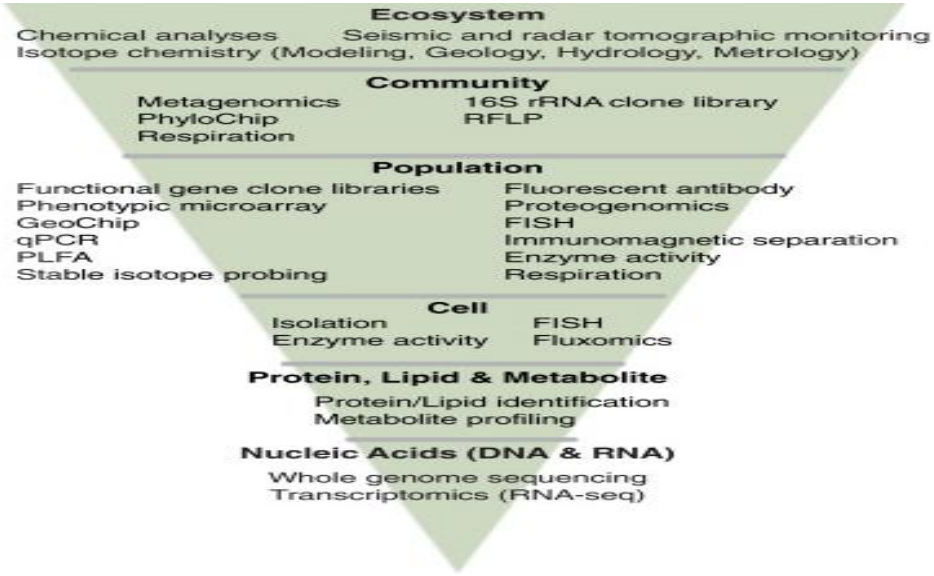

Figure 1. Above image shows Systems biology from molecules to ecosystems, i.e an ecosystem comprises of communities, populations, cells, protein, RNA, and DNA. The approaches use geochemcial, ecological, genomic, proteomic, metabolomic, and computational techniques. Analyze DNA, RNA, and protein at the cellular levels to understand impacts on the cell in terms of how bioremediation functions, and analyze communities, and populations to understand impacts on structure/function relationships and finally interactomes at the ecosystem level in terms of bioremediation practices.

Types of Bioremediation

Some of the most common types of bioremediation are microbial bioremediation, phytoremediation, and mycoremediation. However, the word bioremediation has evolved in recent years to include biohazard removal and crime scene cleanup services.

Bioremediation can either be done "in situ", which is at the site of the contamination itself, or "ex situ," which is a location away from the site. Ex situ bioremediation may be necessary if the climate is too cold to sustain microbe activity, or if the soil is too dense for nutrients to distribute evenly. Ex situ bioremediation may require excavating and cleaning the soil above ground, which may add significant costs to the process.

Advantages of Bioremediation

- Bioremediation offers more number of advantages over other methods of cleanup.
- Minimum wastage of groundwater.
- More accepted by community as compared to other conventional systems due to relying singly on natural processes, it is benefited to ecosystems.
- It is with the capacity to convert carcinogenic compound into low or non carcinogenic compounds.
- It is often takes place underground, where amendments and microbes can be pumped in order to clean up contaminants in groundwater and soil.
- The bioremediation process creates relatively few harmful byproducts (mainly due to the fact that contaminants and pollutants are converted into water and harmless gases like carbon dioxide).
- It consume less energy and it is cheaper than most cleanup methods because it does not require substantial equipment or labor and operating cost .
- It is environmentally secured.

Disadvantages

- The system said poorly designed can leads to production of more carcinogenic products.
- Immobile contaminants can be mobile due to the processing of bioremediation.
- It also leads to secondary water quality.
- It can be relies on biological success to work i.e having limitations in acidic and saline situation.

CONCLUSION

To solve the issues of factors damaging environment we must have to allow remediation within a specific period, metal uptake and plant yields have to be enhanced fastly . For this, a continuous search for the engineering plants those are acting profoundly for detecting the suitable functioning of genes are necessary. Also for getting, a multidimentional strategy by involving plant biologists, soil chemists, microbiologists, and environmental engineers is required for greater success of bioremediation, which could act as a dyanamic cleanup process .

REFERENCES

Reda Abd El-Aziz Ibrahim Abou-Shanab: Bioremediation: New Approaches and Trends www.researchgate.net/publication . August 2011.s