A Review Paper on Biotechnological Tools for Environment

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***ABSTRACT:**The atmosphere is a very significant factor and important for the survival of both humans and other biotic organisms. The physical environment's degree of sustainability is an index of the health and well-being of all the components in it. In addition, attempting to dispose of toxic/deleterious substances using any known process is not appropriate.The best way to preserve the ecosystem is to return all the components (wastes) in a recyclable way so that the waste becomes usable and helps to maintain an aesthetic and safe balance that characterizes an ideal environment in the biotic and abiotic relationship. The approach investigated in this study involves the biological method of environmental sustainability, which aims to investigate the different biotechnological tools (bio-tools) currently in use and those under investigation for potential use.Biotechnological instruments are those processes of bio-scientific interest that use the chemistry of living organisms through cell manipulation to develop new and alternative methods to produce traditional products cleaner and more efficient, while at the same time preserving the natural and aesthetic beauty of the environment.*

***KEYWORDS:**Biotechnological, Biological, Chemical,Environmental, Natural.*

INTRODUCTION

In comparison to the traditional chemical synthesis of products, biotechnology is the latest trend in manufacturing processes around the globe. The explanation is because biotechnological approaches are eco-friendly, whereas toxins and waste are introduced to our ecosystem by the latter approach[1]. The need for alternative, inexpensive and effective biological methods of pollution treatment has given impetus to many problems associated with traditional methods of pollutant treatment by incineration or landfills.Table 1 illustrates the classification of biotechnologies[2]. Table 2 illustrates the environmental procedure plus bioremediation events involved.

Table 1: Illustrates the classification of biotechnologies[3]**.**

Red	Medical
Yellow	Food biotechnology
Green	Agriculture
Blue	Aquatic
White	Gene-based industry
Grey	Fermentation
Brown	Arid
Gold	Nanotechnology/bioinformatics
Purple	Intellectual
Dark	Bioterrorism/warfare

Table 2: Illustrates the environmental procedureplus bioremediation events involved[4]**.**

Environmental condition	Biosystem/microbes used	Bioremediation benefit
Waste water and industrial effluents	Sulphur-metabolising bacteria	(1) Microorganisms in sewage treatment plants remove common pollutants (heavy metals and sulphur compounds) from waste water before it is discharged into rivers or sea. (2) Production of animal feed from fungal biomass after penicillin production in penicillin industries. (3) Useful biogas (methane, etc.) production from anaerobic waste water treatment.
Drinking and process water	Organic degrading microbes (Bacteria, fungi, and algae)	(1) Reclamation and purification of waste waters for reuse and provision of portable recyclable drinking water for the public consumption and for livestock use. (2) Remove wastes for organic fertilizer agric use.
Air and waste gases	Bacteria, fungi	Biofilter application of pollutant purifying bacteria. Application of bioscrubbers, immobilized microorganism in inert matrix and nutrient film trickling devices for better air and gas purification. For example, bioscrubber-based system for removal of nitrogen and sulphur oxides from flue gas of blast furnaces in place of limestone gypsum process, and elimination of styrene from the waste gas of polystyrene processing industries by a fungi biofilter model.
Soil and land treatment	*Pseudomonas* spp., *Bacillus* spp., Fungi, *Rhodococcus*, *Acinetobacter*, *Mycobacterium*	Both in situ (in its original place) and ex situ (somewhere else) are commercially exploited for the cleanup of soil and groundwater. Use of microorganisms (bioaugmentation, ventilation, and/or adding nutrient solution (biostimulation) that is, petroleum decontamination, can involve use of plants (phytoremediation). Bacteria in association with roots of plants (Rhizobacterium), and so forth. Use of bioreactors for ex situ treatment with introduction of suitable microbes and environmental factors.
Solid waste	Bacteria, fungi, and so forth	Composting or anaerobic digestion of domestic and garden wastes helps in recovery of high-value biogas and useful organic compost without the toxic components. Free breakdown of solid waste by microbial biota for recyclable waste, an acceptable alternative to incineration.

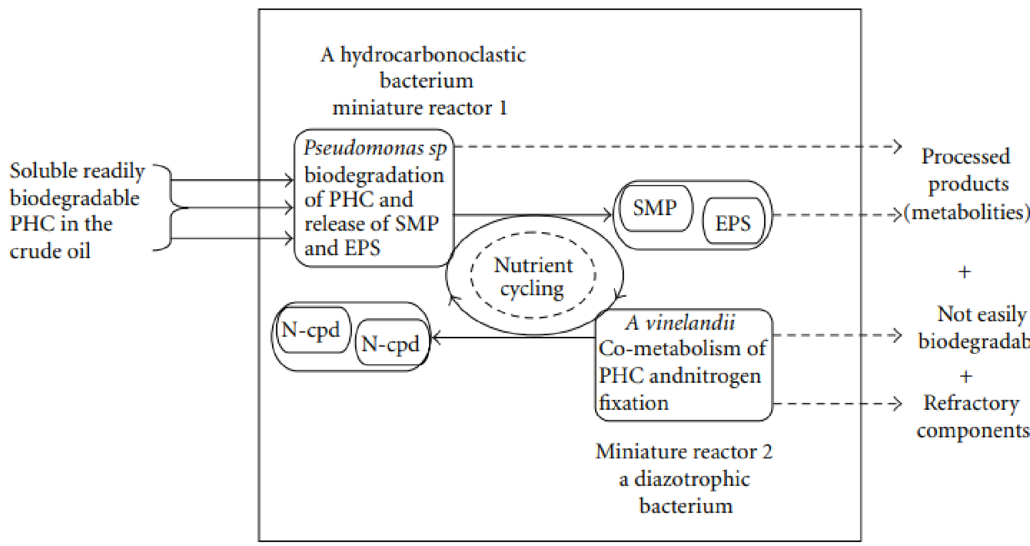

Figure 1: Depicts the simplified bioremediation conceptual model[5]**.**

Natural ecosystems have decreased as the human population of the world has increased, and shifts in the equilibrium of natural cycles have had a detrimental effect on both humans and other living systems. There is also ample scientific evidence that mankind is living unsustainably, and a significant collective effort would be needed to restore the human use of natural resources to its limits[6]. Biotechnology remains the most reliable way of preserving the environment, considering the complexities of population growth and its resulting pollution problems. The planet is currently threatened; in our otherwise aesthetic climate, the government and citizens of many counties are worried about this endemicity of contaminants (most of which are recalcitrant). In general, Africa and Nigeria, in particular, have not completely imbibed the advantage of using biotechnology to sustain a beautiful climate[7].

DISCUSSION

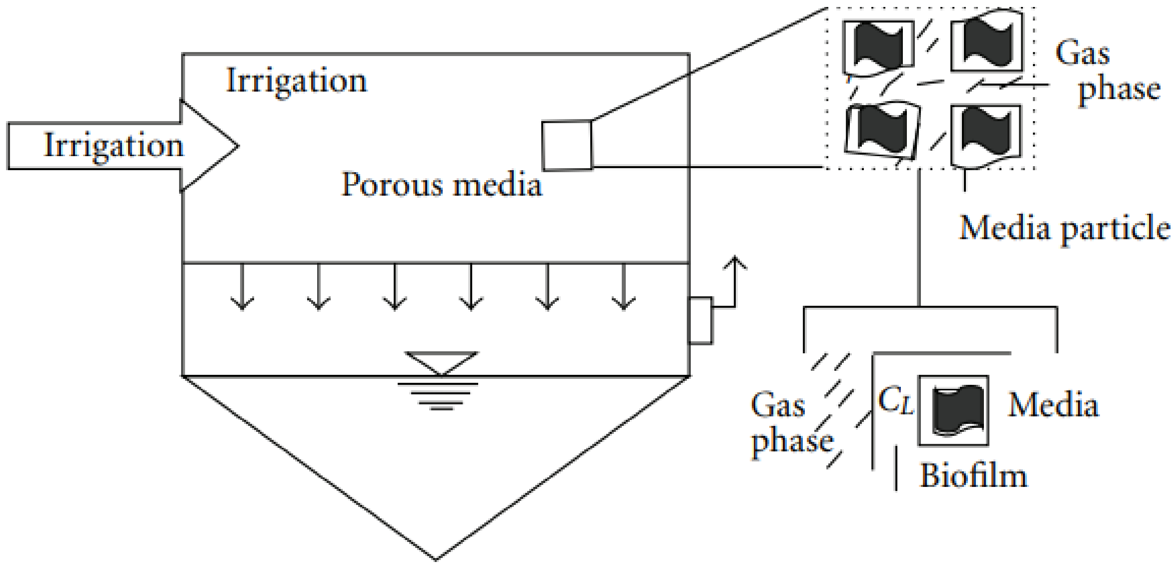

Figure 2: Depicts the schematic of the packed bed biological control system.

Bioremediation is the use of biological systems to reduce air or aquatic or terrestrial pollution, and also involves extracting and exposing a microbe from the environment to a target contaminant to reduce the toxic component. The aim of bioremediation is therefore to use bio-systems such as microbes, higher organisms such as plants (phyto-remediation) and animals to reduce the potential environmental toxicity of chemical contaminants by degrading, transforming and immobilizing these unwanted compounds[8]. The use of living organisms to enzymatically attack and otherwise break down various organic chemicals into less toxic chemical species is biodegradation. Pollutants are categorised by biotechnologists and bioengineers with regard to the ease of degradation and the types of processes responsible for this degradation, often referred to as treatability.

The most frequently occurring bioremediation option is microorganism biodegradation. Microorganisms, for their growth and/or energy needs, can break down most compounds. These processes of biodegradation may require air or may not need it. In some cases, to break down pollutant molecules, metabolic pathways which organisms normally use for growth and energy supply may also be used. The microorganism does not benefit directly in these situations, known as cometabolisms. This phenomenon has been taken advantage of by researchers and used for bioremediation purposes.Figure 1 depicts the simplified bioremediation conceptual model. Figure 2 depicts the schematic of the packed bed biological control system.

CONCLUSION

The much needed change to bring about these developments informed the United Nation's decision to elaborate on the key agenda that most nations are expected to adhere to in order to achieve certain objectives known as the Millennium Development Goals, in the context of the need to meet certain challenges that affect development. Achieving these targets, with the goal of ensuring that the participating countries provide their people with the essential good things of life. Since environmental biotechnology is highly dynamic as well as futuristic, the bio-tools enumerated by the authors are by no means exhaustive. Aquaculture treatment/management, bio testing, bioleaching, biocatalysts, bio detergent/bio solvent processing, bio filtration, bioremediation, biomass fuel production, and so on are those widely practised elsewhere and very little if at all in Nigeria, which are being enhanced. Therefore, by applying some of the biotechnological tools appropriate for such an environment, changes in the quality of the human environment can be accomplished everywhere.

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