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MAJOR FUNCTIONAL ROLES OF MICROBES IN DIFFERENT INDUSTRIES

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ABSTRACT
The earth's surface is naturally covered with soils, which are the boundary between three different material states: solids (geological and decomposed biological elements), liquids (water), and gases (air in soil pores). Each soil is a unique outcome of the interaction of the geological parent material, glacial and geomorphological history, the presence and activity of biota, the history of land use and disturbance regimes, and the existence and activity of these organisms. Microbes have ecological interactions with almost all life forms. Likewise, humans invariably engage in host-microbial interactions that could induce short-term or long-term effects. They are used in pharmaceutical industries for the synthesis of chemical compounds. Nowadays, chemical industries using the bacteria to synthesis the industrial products like. Some important features of bacteria in food industries remain unclear. This review highlighted the role of bacteria in industries for synthesis of compounds in medical as well as industrial point of view but some of the bacterial species have great impact on the human body thus causing serious diseases in human. Bacteria are used to create multiple antibiotics such as streptomycin from the bacteria streptococcus. Another important role in pharmaceuticals is the use of microbes for the medically important studies.

Key words **:** *Soils, environments, resources, industries*

INTRODUCTION
Microbes are found everywhere as a source of beneficial as well as harmful for human as they are used for synthesis of compounds in different industries and other useful products. While on the other hand, they are also causing diseasing in human at different rates. Hence, they are used for making yogurt, cheese, wine and bread. They are causing different diseases like tuberculosis that causes lungs to damage than normal as air cannot properly enters into lungs due to blockage of air passage ways. They are also causing severe infections when develop resistance against the antibiotics that are used to treat them. As the bacterial pathogens grow with environment, they start developing resistance against variety of drugs.
Microbes are used in different industries for manufacturing the vinegar and different types of alcohol due to their activity at the maximum rate. They are used in pharmaceutical industries for the synthesis of chemical compounds also in pharmaceutical studies. Nowadays, chemical industries using the bacteria to synthesis the industrial products like. In this way, they are helpful in industrial point of view due to great impact for manufacturing of compounds. Sometimes, they are used in combination with other organisms in order to perform the dual functions with algae as mutualism. This relationship helpful in agricultural fields that ultimately leads to provide the large variety of agricultural products.

Role of Microbes in diverse Industries

Different methods are used for diagnosis of microbes at cellular and molecular level. Each method specifically designed in order to target the specific microbes. Although molecular methods like polymerase chain reaction, Sanger sequencing, and fluorescence in situ hybridization techniques brought a deeper insight into the composition of the intestinal microbiota, it turned out that many members of the microbiota cannot be cultivated with current laboratory methods. These laboratory investigation of the procures helpful to diagnose the infections caused by different microbes. Different useful species of bacteria are sued for synthesis of compounds such as lactic acid bacteria (LAB) are used to produce cheese, yoghurt, kefir and kimchi. These bacteria are involved so much to other food products. The budding yeast Saccharomyces is used to make bread, beer, cider and wine. Acetic acid bacteria (AAB) are used in traditional manufacturing of vinegar. These bacteria playing significant role in food products, cosmetics at low cost and high rate of production. The other reason of using these bacteria is the less toxicity induced due to which cells cannot go through the cell division.

Fig-1: Shows the baculoviruses attack on leave

It resulted the failures of differentiated cells. Baculoviruses are the viruses that potentially infected the most of insects. These infected insects then enters into the living cells and ultimately damage them by replicating with uncontrolled division. These viruses are involved in the activating the chitinase enzyme the damaged the living cells and turned them into dead cells by disruption the cellular and molecular processes. The virus replicates by budding from cell to cell, and it makes the infected insect move to the top of the plant towards the light. There is need to deigned the antiviral drug that target the cells of baculoviruses at the molecular and cellular level and inhibiting their growth once these viruses entered into the cells.

Role of Microbes in Pharmaceutical industry

Bacteria are used to create multiple antibiotics such as streptomycin from the bacteria streptococcus. Another important role in pharmaceuticals is the use of microbes for the medically important studies, such as bacteriorhodopsin. Microbes are also used in pharmaceutical industries for synthesis of chemical drugs, chemical compounds and other compounds. It also leads to discovery of cell mechanisms allows pharmacists to discover antimicrobial drugs that would prevent an escalating number of communicable diseases. It also insures the drug therapies target the opportunistic microbes without harming its human host.

Bacteria also playing important role in manufacturing of different hormones thus helpful to control the lethal diseases. The most important principle used for preparation of hormones using is the genetic engineering. Bacterial cells are transformed and used in production of commercially important products. Examples include production of human insulin that is used to treat diabetes and human growth hormone also called somatotrophin used to treat pituitary dwarfism.

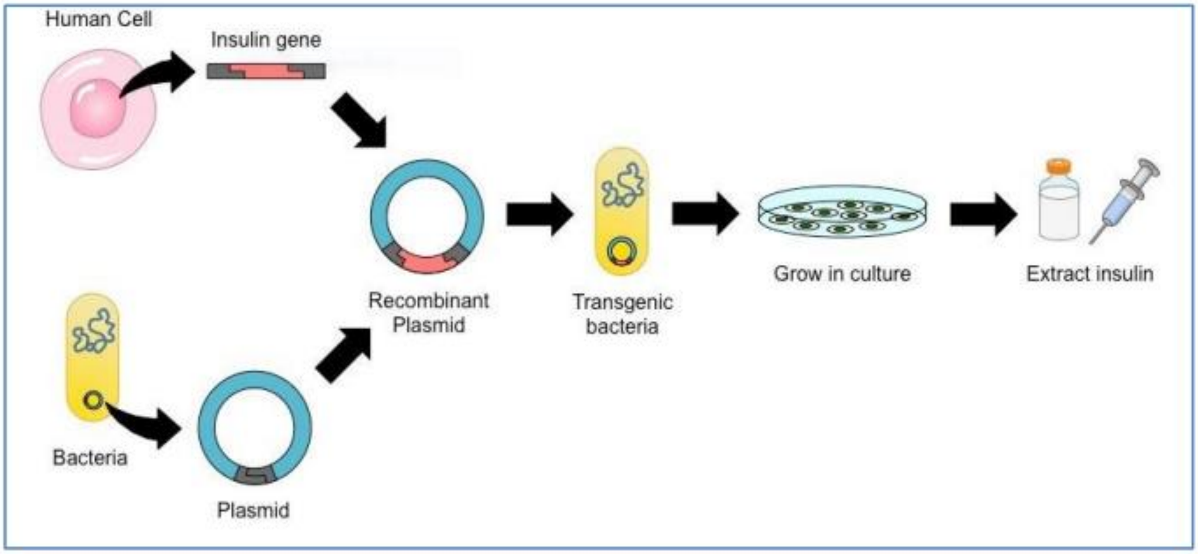

Fig-2: Shows production of human insulin from bacterial cell via genetic engineering approach

Genetic engineering uses principles in combination with biological sciences such as biochemistry, microbiology, biotechnology have been made revolutionized is the manipulation of genes. It is also called recombinant DNA technology. In genetic engineering, pieces of DNA (genes) are introduced into a host by a variety of techniques, one of the earliest being the use of a virus vector. The foreign DNA becomes a permanent feature of the host, and is replicated and passed on to daughter cells along with the rest of its DNA. This principle used for transfer of DNA into different species, synthesis of novel hormones, discovery of genes. Escherichia coli are used for commercial preparation of riboflavin and vitamin K. These are involved in nutritional supplementation used to treat the deficiency of different diseases either due to vitamins and minerals which are required for proper growth in small quantities and regulate the body processes. This bacterial also lives in intestine of human when it active, it damages the digestive tract and causes the diarrhea and other problems associated with digestive system. E.coli as useful for manufacturing of chemical compounds while on the other hand also causes problems. Bacteria are important in the production of many dietary supplements. E.coli is also used to produce D-amino acids such as D-p hydroxyphenylglycine, an important intermediate for synthesis of the antibiotic amoxicillin which can be used to treat the infections such as skin, ear and urinary tract. Amoxicillin acting as antibiotic controlling the number infections and excess dose leads to cellular toxicity and hence disruption occurs to cell membrane due to accumulation of toxins release by them. Toxins that produced also affected the liver that acting the major organ of the human.

Numerous and often crucial roles are played by fungus, bacteria, archaea, and soil microorganisms in various ecological functions. The enormous metabolic variety of soil microorganisms implies that their activities drive or contribute to the cycling of all main elements (for example, C, N, and P), and this cycling influences both the structure and functions of soil ecosystems and the capacity of soils to give benefits to humans. An overview of the functions of soil microorganisms in providing and controlling ecosystem services is given in Table 1. Indirectly, soil bacteria have an impact on the SOM that is physically protected by promoting soil aggregation, which in turn helps soils stabilise carbon.

Table 1

Role of soil microbes in provisioning and regulating services provided by soil ecosystems

Soil service	Descriptor	Role of soil microbes
Provisioning services – products obtained from ecosystems		
Physical support	Soils form the surface of the earth and represent the physical base on which	Microbes contribute to soil formation through nutrient cycling and organic matter

	animals, humans and infrastructures stand. Soils also provide support to animal species that benefit humans (e.g. livestock).	production. Microbial products are critical to soil aggregation, improved soil structure making soil more habitable for plants.
Raw materials	Soils can be a source of raw materials (e.g. peat for fuel and clay for potting).	Soil microbes produce antimicrobial agents and enzymes used for biotechnological purposes.
Growth medium for plants	Humans use plants for food, building, energy, fi bre, medicines and more. By enabling plants to grow, soils provide a service to humans. Soils physically support plants and supply them with nutrients and water	Soil microbes mobilise nutrients from insoluble minerals to support plant growth.
Buffering Water flows	Soils have the capacity to store and retain quantities of water and therefore can mitigate and lessen the impacts of extreme climatic events (e.g. limit flooding). Soil macmpomsity and hydrological processes like infiltration and drainage impact on this service.	Soil microbes are formed by plant roots, canInvonns and other soil biota, which may depend on soil microbes as food or for nutrients.
Nutrient cycling	Soil is the site of the decomposition of organic materials and the mobilisation of nutrients in bedrock and soil aggregates. Soil is also the site of the oxidation and reduction of nutrient elements, symbiotic N-fixation and ph otoautouophic activity.	The activities of soil bacteria, archaea and fungi drive nutrient cycling in soils and are involved in weathering minerals.
Recycling cf wastes and detoxification	Soils absorb, detoxify, and recycle applied wastes (e.g. cffluent disposal), agrochemical!, and spills of fuels and oils, reducing potential harm to humans and to otganisms useful to humans.	Microbial processes like mineralisation and immobilisation are responsible for this service. Detoxifying microbes may be limited by the availability of soil nutrients (e.g. N or P). which in turn depends on soil microbial activities.
Filtering of contaminants	If pollutantsfez. excess nutrients, exotic microbes, metals, organic compounds) arc leached from soils, they can con- laminate aquatic ecosystems and threaten human health. Soils absorb and retain solutes and pollutants, avoiding their release into water.	In COMM with the clay and organic matter content of soils, microbial products contribute to both the hydrophobicity and wettability of soils, impacting on the ability of soils to filter contaminants
Habitat for biodiversity	A very large component of global biodiversity occurs in soils. Some organisms have above-ground lift stages or are food resources for above-ground specks Soils are a reservoir for	Soil bacteria, archaca, and fungi comprise the vast majority of the biological diversity on earth. Funher, they are the founds-tion of soil food webs thereby underpinning the diversity of higher trophic levels. Interacts

	resting phases of organisms (e.g. seeds, fungal spores) and thus are critical for the rejuvenation of corrununities.	tins among soil microbes and plants often determine plant biodivcrsity.
Biological control of pests, weeds and pathogens	Soils provide habitat to beneficial specks that regulate the composition of communities and thus prevent proliferation of herbivores and pathogens. This service depends on soil properties and the biological processes driving inter- and intra-specific interactions (symbiosis, competition, host-prey associations)	Beneficial species include bacteria, archaea, and fungi that support plant growth through increasing nutrient availability and by outcompeting invading pathogens.
Carbon storage and regulation of greenhouse gas emissions	Soils play an important role in regulating many atmospheric constituents, impacting on air quality, and on regional and global climate. Soils store carbon as stable organic matter offsetting CO_2 emissions and are home to microbes that release nitrous oxide (N_2O) and methane (CH_4).	By mineralising soil carbon and nutrients, microbes are major determinants of the carbon storage capacity of soils. Denitrifying bacteria and fungi and methane producing and consuming bacteria regulate nitrous oxide (N_2O) and methane (CH_4) emissions from soils.

Bacteria, archaea and fungi

The smallest autonomously living single-celled creatures on earth are bacteria and archaea. The diameter of typical cells ranges from 0.5 to 1.0 m. Archaea and bacteria may create spirals, rods, or cocci, and certain bacteria that are widespread in soil, such the Actinomycetales, can generate branching filaments. Most have free DNA in the cytoplasm because they lack a proper nucleus that is attached to a membrane. A single circular double-stranded DNA molecule makes up the majority of their genome, while cells may also include additional, much smaller DNA components known as plasmids. The genome's size varies based on the organism's lifestyle and degree of complexity, but it normally measures 4 to 6 million nucleotides and contains the genetic instructions for 3000 to 4000 genes. The cell is enclosed by a phospholipid cell membrane. The cell wall, which varies in composition based on the organism but is typically formed of proteins, carbohydrates, and lipids, is located outside of this. Using fl agella, many microorganisms can migrate (whip-like extensions from the cell). Additionally, they have the ability to create tiny fibres called pili, which may attach the cells to one another or to earth surfaces. Some microorganisms conjugate, or adhere to other microbes, by transferring DNA via the use of specific pili. They normally split in half to reproduce asexually; some cells may divide every 12 to 20 minutes, while others take considerably longer.

Like all living things, bacteria and archaea need carbon to provide the building components for their cell structure. Energy is also needed to fuel the processes that take place during cell formation and metabolism. While most archaea and some bacteria employ alternate electron acceptors like nitrate and sulphate, certain bacteria need oxygen to develop (i.e. they respire nitrate and sulphate). Oxygen may be hazardous for certain anaerobic species. Microbes may be broadly categorised as either autotrophs or heterotrophs.

Heterotrophs employ organic carbon molecules as a source of carbon and energy, whereas autotrophs use energy from sunlight or inorganic substances (such as Fe^{2+}, nitrate, or nitrite) to fix atmospheric carbon dioxide to make carbs, lipids, and proteins.

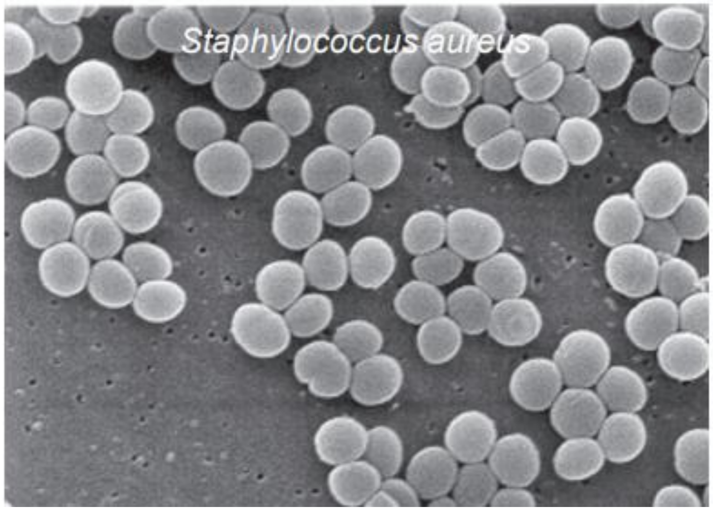

Fig.- 3 : Examples of the structure of bacteria and/or fungi.

We now know that archaea are extensively dispersed and are found with bacteria in various settings, including soil. Originally, archaea were considered to exclusively live in extreme conditions and were sometimes referred to as "extremophiles." On the basis of their morphology, bacteria and archaea are difficult to identify from one another. All life, however, may be split into three domains according to molecular phylogenetic methods based on a comparison of 16S ribosomal rRNA sequences, with Archaea being more closely linked to Eukarya (all multicellular creatures) than Bacteria.

Due to their eukaryotic status, fungi are more closely linked to plants and animals than they are to bacteria or archaea. The nuclei of fungal cells are membrane-bound and contain DNA-containing chromosomes, much like those of other eukarya, including humans. They also include organelles that are membrane-bound, such mitochondria. The cell wall of fungi is made up of glucans and chitin industries. Being a saprobe, or an organism that feeds on decaying materials, is the "normal" nutritional approach for fungi, which are heterotrophic creatures. While certain forms of fungal growth are single-celled creatures known as yeasts, the majority develop as hyphae, which are cylindrical structures with a diameter of 2 to 10 micrometres. The hyphae may either be septate, which is composed of compartments split by cross walls, or nonseptate. The tips of the hyphae are where fungi develop. The basic structure of the fungus, the mycelium, is made up of many interconnected hyphae. The mycelium, which is finely and intricately branched, fills a substantial amount of soil and generates a broad range of enzymes that interact with soil organic matter and mineral compounds to release the nutrients and energy the fungus needs to thrive.

Fungi may reproduce sexually or asexually. Spores, a broad word for resilient resting structures, are created by both processes. Yeasts divide through binary fission or budding. A typical fungal life cycle includes sexual reproduction, which involves the mating of suitable spores, and the "imperfect stage," which entails asexual reproduction and results in the budding of spores. Fungi, like bacteria and archaea, are very varied, and because of their distinctive life-history methods, they may play a broad range of ecological functions, including decomposers, mutualists, pathogens, and even predators. As feed for the grazing soil biota, fungus hyphae are essential parts of soil food webs. For bigger animals, fungus sporocarps are an essential food source.

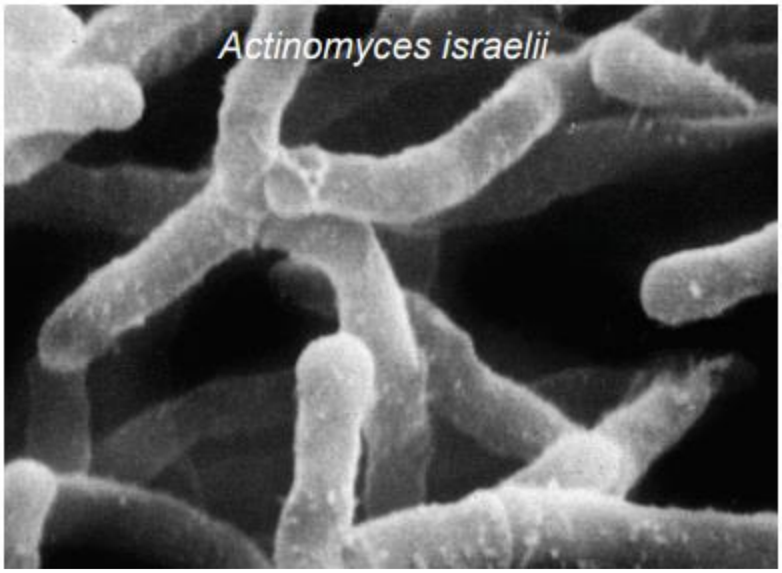

Fig.-4 : Illustrations of the structure of bacteria and/or fungi

Major functional roles of fungi in soil

Although fungus undertake a wide range of tasks, the saprotrophs, mycorrhizas, and lichens are three functional groupings of fungi that are particularly significant in soil ecosystems.

The large variety of enzymes produced by saprophytic fungus includes amylases, proteases, lipases, and phosphatases. The hyphae at the front of the mycelium, which is growing through its substrate, create these enzymes. The mycelium will often spread outward in a radial pattern from a single germinated spore, forming a ring of metabolic activity. The sugars, peptides, amino acids, and lipids released by the fungal enzymes may not always be consumed by this fungus; instead, bacteria, plants, and other soil biota, including other fungi, struggle fiercely for them. Therefore, saprotrophic fungi enhance the biomass and variety of soils and are essential to decomposition by supplying substrates to other soil organisms. This is especially true for families of saprotrophic fungi that specialise in breaking down hard-to-degrade plant and animal materials including lignin, chitin, and keratin as well as other fungus and insect exoskeletons (in plants). For instance, "white-rot" fungi are special because they can break down lignin into less resistant compounds that can be acted upon by a broader range of species' enzymes. Fungi that are saprotrophic are essential to the global carbon cycle.

Mycorrhizal fungi associate with live plant roots in mutually beneficial symbiotic relationships. The symbiosis is based on the exchange of resources: the plant gives the fungus sugars as a source of carbon, and the fungus gives the plant nutrients from the soil. Mycorrhizal associations are formed by the great majority of terrestrial plants, and they enable plants to inhabit a considerably wider variety of soil habitats than would otherwise be conceivable. The greatest variety of host plants may establish symbioses with arbuscular (AM) and ectomycorrhizal (EM) fungus. About 80% of all plant species are colonised by AM fungus, which are particularly common in herbaceous species like many significant agricultural plants. The arbuscule, a finely branched, tree-like hypha that actually penetrates the plant root cell, serves as the location of nutrition exchange in plants. Even though AM fungi's mycelia are typically smaller than EM fungi's, they are crucial for allowing plants access to inorganic soil phosphorus.

EM fungus develop relationships with the majority of prominent trees and woody plants in temperate climates, including the economically significant pine, spruce, fir, oak, beech, poplar, and willow. In EM relationships, the fungus mostly stays on the root's surface and only enters between root cells, but it may also generate a substantial extra-radical mycelium. EM fungi are important decomposers of organic compounds in soils, much as saprotrophic fungus. EM fungus may have the energy to manufacture energetically more costly enzymes than normal saprotrophs since they are fed by carbon from the plant. While EM fungi predominate deeper in the soil profile, where they mobilise nitrogen for utilisation by their host plants, saprotrophic fungi often dominate the upper layers of the soil profile where they breakdown newly shed plant litter. Because EM fungi tend to be non-specific to host plants and have a large amount of mycelium, this allows their vegetative hyphae to fuse to one another (anastomose), which results in EM fungus often forming huge, complicated subterranean connections known as mycorrhizal networks. All significant terrestrial ecosystems have mycorrhizal networks (MNs), which enable the exchange of materials between plants such as carbon, nutrients, water, defence signals, and allelochemicals. Almost all seeds that sprout in soil do so inside an established mycorrhizal network, enabling the new plant to readily use this resource-transfer channel below ground. As a result, MNs have significant impacts on the establishment, survival, and development of plants. They also have ramifications for the variety and stability of plant communities in response to environmental stress.

Bipartite symbiotic interactions between a fungus and a green alga, and sometimes additionally with cyanobacteria, result in lichens (tripartite symbiosis). The fungus provides the symbiosis' "body," shielding the photobionts from radiation and dehydration and secreting organic acids that help the substrate's insoluble minerals dissolve. The cyanobacteria, if any are present, fix atmospheric nitrogen into ammonium, an useful form of nitrogen, while the alga uses photosynthesis to create carbon. Lichens are symbiotic organisms that are nutritionally self-sufficient and extremely resilient to temperature and humidity fluctuations, with a special adaptation to desiccation. This enables them to survive in a variety of ecosystems that are inhospitable to plants, such as the High Arctic, the Antarctic, as well as alpine and desert regions. Lichens often develop in one of three ways on these bare substrates: crustose (producing a crust), foliose (leafy), or fruticose (lacy).

Heavy metals and soil microbes

Environmental heavy metal contamination is pervasive. More than 35% of the elements in the periodic table are heavy metals, which are defined as having a density higher than five. In extremely small concentrations, certain of them, such as zinc (Zn), iron (Fe), copper (Cu), manganese (Mn), and molybdenum (Mo), are crucial for plant and animal nutrition. They function as cofactors of enzymes and take part in redox and osmoregulation activities. It is well knowledge that both prokaryotic and eukaryotic microorganisms employ metals for structural and/or catalytic purposes. However, they are all classified as hazardous and harmful to plant and animal health over a particular threshold level. Some heavy metals, such as mercury (Hg), cadmium (Cd), and lead (Pb), are not necessary for the life cycle of living things. They may alter protein structure, substitute for necessary components, disrupt cellular and enzymatic processes, harm cell membranes, and damage DNA. Therefore, heavy metals may damage the life cycle of living things. This is explained by their prolonged biological half-life, toxicity, and inability to decompose. The ecology depends on soil bacteria and is comprised entirely of them.

Table 2

Plant species exhibiting resistant to high dosage of heavy metals and with potential of phytoremediation

Plant	Metal
Brassica juncea	As, Cd, Cu, Pb, Hg, Zn, Cr, Ni,Se
Vetiveria zizanioides	Pb, Zn
Cardaminopsis halleri	Pb
Spartina altemijlora	Pb
Cynodon dadylon	Pb
Sorghum halepense	Pb
Helianthus annum	Pb, Cd
Hemidesmus indicus	Pb
Preris vittata	As, Pb
Preris cretica	As
Preris utnbrosa	As
Preris longijolia	As

Alyssum sp.	Ni
Hordeum vulgare L	Cu, Cd, Zn
Avena sativa L.	Cu, Cd, Zn
Medicago saliva	Cu, Pb, Cr, Ni
Thlaspi caerulescens	***Cd, Zn.*** Ni
4ropersicon	Cd, Ni
Phytolacca acinosa	Mn
Avena sativa	Cd and Pb
Padina sp.	Cu. Pb
Sargassum sp.	Cu. Pb
Bidens pilosa	Pb
Tagetes minuta	Pb

The microbial biomass and chemical pollutants found in soil, such as radionuclides and heavy metals, interact intricately with other soil ecosystem components. The kind and amount of chemical pollutants, such as heavy metals, may control the soil microbial biomass, their activities, and their dynamic behaviour. However, with the assistance of specialized enzymes, certain microorganisms, such as bacteria, protista, and fungus, can breakdown heavy metal complexes and turn the end product into a component of their metabolism. The heavy metal is either eliminated throughout the procedure or changed into a harmless chemical.

It has been shown that soil bacteria may lower metal mobility and bioavailability by biosorption and bioprecipitation. We'll go into more depth about these and other heavy metal immobilisation and sequestration techniques by soil bacteria. The primary cause of heavy metal contamination is human activity, although the chemical matrices of the soil largely regulate its solubility, transport, retention, and availability. High metal concentrations in creatures' live tissues have led to fatal neurological diseases, severe organ damage, and final death.

Components of soil microbial biomass

The biotic component of soil systems, or soil biota, is made up of living things that are either visible to the human eye or very small. They are composed of several organisational levels, including cellular, tissue, and systemic levels. Different soil organisms are involved in various physical and metabolic activities. Each group of organisms has different behaviours depending on their sizes and functional variety within the soil environment, which is how they were divided into functional groups. They are divided into functional groups that include ecosystem designers, litter transformers, predators, decomposers, microregulators, soil-borne pests and illnesses, and prokaryotic designers. The macrofauna, mesofauna, and soil microbial biomass are the main target groups for soil organisms in these functional categories (microflora and microfauna). The variety and functions of the soil biota's target groups may be discussed further when they have been classified into groups.

Macrofauna

The majority of macrofauna consists of 1 cm length and 2 mm or larger diameter soil creatures. The most noticeable of the three target groups, macrofauna are soil animals that are sometimes referred to as the "soil ecosystem engineers" (Lavelle et al. 1999) and play an important role in the construction of soil structures. Their tunnelling and burrowing activities maintain soil aggregates via mechanical mixing and bioturbation, which in turn affects air and water flow as well as the distribution and transformation of organic materials (Swift et al. 2008; Ayuke 2010). As part of their functional variety, many macrofauna work as soil predators and litter decomposers. Earthworms, termites, ants, beetles, millipedes, centipedes, and huge arachnids are a few examples of soil macrofauna.

Mesofauna

The 0.2-2 mm-sized creatures that make up the soil mesofauna serve as predators and litter decomposers. They consume other soil microorganisms including bacteria and fungus as well as organic materials. By modifying the number of microorganisms that participate in the breakdown of organic matter, this in turn affects the functioning of the soil ecosystem overall. Collembolan, enchytraeidae, acari (mites), protura, pauropoda, certain nematodes, and larval macrofauna are a few examples of soil fauna. Evidence points to the importance of mesofauna, including Collembola and enchytraeids, in the stability of soil aggregates, water and air flow in compacted soils, and the creation of finely structured soils.

Microorganisms

Microfauna and microflora are two categories for soil organisms that are actively engaged in various microbial activities in the soil and have sizes smaller than 0.2 mm. Natural agroecosystem soil fertility relies on microbial activities such N2 fixation, soil organic matter transformation, and mineralization of organic nitrogen (N), carbon (C), sulphur (S), and phosphorus (P). These processes are all carried out by soil microbial biomass. The alternate uptake and release of N and C by soil microorganisms is engaged in the breakdown of organic soil materials, and the rate is often influenced by the kind of plant material and their corresponding C:N ratios. The internal structure of cyanobacteria, often known as blue-green algae, is similar to that of higher plants, and because of their capacity to fix nitrogen, they play a crucial role in agricultural soils. The use of algae in wastewater bioremediation for eutrophication research has grown significantly in recent years. The rhizosphere is home to a variety of bacteria and fungi, including pseudomonas, achromobacter, flavobacterium, streptomyces, aspergillus, and arthrobacter. They have a history of making heavy metals and phosphate accessible by solubilizing them.

The physicochemical and biological characteristics of the soil, such as its structure, pH, redox state, and soil enzymes that affect the solubility and bioavailability of heavy metals in the soil, are all impacted by microbial activity.

CONCLUSION

As cholera and plague are most common bacterial infections that affected the human populations all around the world. Microbes can be used in controlling of different diseases as beneficial in one aspect as well as harmful. There is need to discovery of novel drugs from microbes that helpful to control the different diseases.

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