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BIOLOGICAL LIFE IN SOIL

Samandeep Kaur[1], Jasjot Singh Gill[2]

**Lecturer, Department of Agriculture, Baba Farid College, Bathinda.*

ABSTRACT

Soil is home of biological life. A number of microorganisms living in soil are Bacteria, Archaebacteria, Actinomycetes, Fungi, Algae and Protozoa etc. These microbes play an important role in soil fertility. Soil microbes are responsible for decomposition of organic matter entering the soil and recycle nutrients in soil. Soil microbes also produce some compounds like plant hormones and vitamins which increase crop yield. Microorganisms involve in cycles of nutrients like carbon, nitrogen and phosphorus cycle. These nutrients are required for proper growth of plant. Some living microbes are used as biofertilizer and biopesticides. Microbes improve water absorption, retention, drainage and aeration of soil. Microbes also produce antibiotic substances which inhibit disease producing organisms in soil.

Keywords: Bioinsecticides, Biopesticides, Nutrient cycles, Organic degradation, Soil microbes, Soil feritilty.

I.INTRODUCTION

Soil is full of biological life. A handful of soil has number of living organisms. All of these microbes are important in making up the environment and involves in transformations that are vitally important to life. Soil organisms improve soil fertility by performing a number of functions that are beneficial for plants. This article examines six of these functions. Different chemical transformation taking place in soil involves soil microorganisms. Microbes play an important role in soil fertility as a result of their involvement in the cycle of nutrients like carbon and nitrogen, which are required for plant growth. Mycorrhizal fungi can increase the availability of mineral nutrients to plants. Nitrogen-fixing bacteria can transform nitrogen gas present in the soil atmosphere into soluble nitrogenous compounds that plant roots can utilize for growth. Some soil microorganisms produce compounds which stimulate the natural defense mechanisms of the plant and improve its resistance to pathogens. Azospirillum induces the proliferation of plant root hairs which can result in improved nutrient uptake.

II.ROLE OF BIOLOGICAL LIFE IN SOIL

Microorganisms living in soil are involve in number of ways to improve soil fertility and soil health. They make all the required nutrients available to plants by getting involved in nutrient cycles. So there are some microbes which take part in nutrient cycles and releasing nutrients from organic matter.

2.1. Releasing nutrients from organic matter:

Soil microorganisms are responsible for the release of nutrient from organic matter. They use carbon present in organic matter during this process for their own growth and then they release excess nutrients into soil from where these nutrients are used by plants. For example, applying organic matter with carbon to nitrogen ratios lower than 22:1 to soil generally increases mineral nitrogen in soil.

2.2. Increasing Carbon availability:

The carbon cycle is type of biogeochemical cycle in which carbon is exchanged between the biosphere, geosphere, hydrosphere and atmosphere of the Earth. Carbon is important nutrient which is required by plant. Different microbes involved in carbon cycle. Many fungi and bacteria attack cellulose and release carbon in the soil. *Trichoderma, Aspergillus,* and *Penicillum* attack cellulose. *Marasmius, Ganoderma, Psalliotta* attack lignin. Actinomycetes and some bacteria also attack lignin. The carbon cycle is largely maintained by balanced action of microorganisms in soil.

2.3. Increasing phosphorus availability:

Some plants form a symbiosis with arbuscular mycorrhizal (AM) fungi which increase phosphorus uptake by the plant. The hyphal strands of AM fungi extend from plant roots into soil and have access to phosphorus that plant roots cannot reach. The AM fungi can provide phosphorus to plants and in return they receive the carbon they need to grow. This symbiosis is important for plants when phosphorus in soil is insufficient for requirement of plant. The microorganisms helps in mineralization. Many fungi and bacteria like *Aspergillus, Penicillum, Bacillus* are potential solubilizers of bound phosphates. These organisms produce organic acids like citric, glutamic, succinic, oxalic, maleic, fumaric etc which are responsible for solubilization of insoluble forms of phosphorous.

2.4. Increasing Sulphur availibility:

In sulphur cycle sulphur moves to and from minerals and living systems. Plants can use sulphur in dissolved form as sulphate. Sulphur is important constitute of certain amino acids like cystine, methionine, thiamine, biotin. Indirectly influence nodulation in legumes, chlorophyll and other pigment formation. In sulphur cycle different bacteria involve, these bacterias are *Desulfovibrio, Desulfatomaculus, Thiobacillus, Chlorobium* and *Chromatium.*

2.5. Fixing atmospheric nitrogen:

Rhizobia fix nitrogen gas from the atmosphere and make it available to the legume by symbiosis and it use carbon from the legume. Plants can utilize nitrogen in form of ammonia, nitrite and nitrates. The transformation of nitrogen into its many oxidation states is key to productivity in the biosphere and is highly dependent on the activities of microorganisms, such as bacteria, archaea, and fungi. *Nitrosomonas, Nitrosospira,* and *Nitrosococcus* carried out nitrification process and denitrification process is carried out by *Bacillus, Paracoccus* and *Pseudomonas*.

Degrading pesticides:

The degradation of agricultural pesticides in soil is primarily performed by microorganisms. Some microorganisms in soil produce enzymes that can break down agricultural pesticides or other toxic substances added to soil. The length of time these substances remain in soil is related to how easily they are degraded by microbial enzymes.

2.6. Controlling pathogens:

Some microorganisms and soil animals infect plants and decrease plant yield. However many organisms in the soil control the spread of pathogens. For example, the occurrence of some pathogenic fungi in soil is decreased by certain protozoa that consume the pathogenic fungi. The soil food web contains many relationships like this that decrease the abundance of plant pathogens.

2.7. Improving soil structure:

Biological processes in soil can improve soil structure. Some bacteria and fungi produce substances during organic matter decomposition that chemically and physically bind soil particles into micro-aggregates. The hyphal strands of fungi can cross-link soil particles helping to form and maintain aggregates.

2.8. Managing soil biological fertility:

Microbes minimise erosion as soil organisms are predominantly located in the surface layers. Select nitrogen fixing bacteria that match the host plant and can tolerate your soil characteristics as nitrogen fixing bacteria form specific associations with legumes. Use fertiliser inputs that complement the activities of arbuscular mycorrhizal fungi as they only increase plant uptake of phosphorus in phosphorus-deficient soils. Choose crop rotations and management practices that decrease the suitability of soil for plant pathogens.

II. CONCLUSION

Soil organisms perform a number of important functions essential for good crop production. They decompose and turn crop residues into fertilizer, humus, carbon dioxide and water and release their nutrients slowly for efficient plant use. Microbes fix atmospheric nitrogen into the soil which plants can use. They produce vitamins, amino acids, enzymes, plant growth regulators and other biological factors important in crop production. They produce antibiotic substances that inhibit potential disease producing organisms in the soil. So in this way biological organisms present in soil play very important role in soil. Biological life is an important part of soil.

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