



The Role of Microorganisms in Sustainable Agriculture

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DESCRIPTION

Microorganisms occur in the natural environment and cause many desirable and undesirable changes. Beneficial microbes outnumber harmful microbes. The diversity of their activities causes disease in humans, animals and plants, thus extracting and depositing minerals to form coal and improve soil fertility. It extends to enhancing.

Soil is made up of five main components. They are organisms, air, water and minerals. Soil is commonly referred to as the loose material on the surface of the earth that supports the growth of the plants, bacteria, fungi, algae, and protozoa that make up the soil organisms. Fertile soils are home to root systems of higher plants and many animals (e.g. insects, worms) and a huge number of microorganisms. The types and amounts of microorganisms present in soil depend on physical characteristics and agricultural practices, as well as other parameters such as amount and type of nutrients, available moisture, and level of aeration, temperature and pH. Soil contains a wide variety of microorganisms, including bacteria, fungi, algae, protozoa, and viruses.

Arbuscular mycorrhizae are present in 80% of plants, including upland crops, vegetables, fruit trees, ornamental plants, and medicinal plants. Arbuscular mycorrhizal fungi form arbuscules in the endodermis of root tissue and form a fine network of hyphae outside the matrix. Arbuscular mycorrhizal fungi increase the uptake of water and nutrients in plants, compete with pathogens for nutrients and colonization sites, and alter their chemistries, allowing fungi, fungi-like organisms, and lineages to grow. Helps treat diseases caused by worms, bacteria, phytoplasma, and physiological disorders. Composition of plant tissue, changes in root structure, relief of environmental stress, increased population of beneficial bacteria in the soil. They also contribute to optimal plant growth and improved nutrient uptake in soils contaminated with heavy metals. Increase. It helps minimize the use of chemical fertilizers and pesticides that are harmful to both the environment and consumers of produce. These beneficial fungi can be used to increase crop yields and establish sustainable non-chemical farming.

Microbial bio control

Microorganisms or their products (toxins) are used by humans to control insects, plant and animal pathogens, weeds, etc. This is called biological control by microbes. This may involve the use of microbial vaccines to control single types or classes of plant diseases. Alternatively, this may involve soil management to promote the combined activity of natural soil and plant-associated microbes that contribute to overall control. Biological control, in its narrowest sense, refers to the control of a single pathogen (or pest) by a single antagonist in a single cropping system.

Advantages

1. Environmentally friendly and leaves no toxic residue.
2. Target specific pathogens and avoid unwanted impacts on beneficial microflora and microbiota. Most of them can be easily grown in a small space in the laboratory.
3. Large amounts of inoculum can be produced inexpensively.
4. Mimicking nature by being exposed to an open environment.
5. Biological control can reduce the use of many pesticides and herbicides, eliminating chemical overuse by farmers and further reducing cultivation costs.

Application

1. *Bacillus cereus* strains - produce the antibiotic zwittermicin - protect tomato and alpha alpha plants from various soil-borne fungi - *Phytophthora* and *Pythium*
2. *P. fluorescens* prevents bacterial staining by competing with *P. Tracy*
3. *Trichoderma viridae*: Control of root rot, stem rot, wilt, lead spot disease, early and late rot, tikka disease, downy mildew, etc. of various crops.

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Received: 04-Nov-2022, Manuscript No. JMBT-22-19482; **Editor assigned:** 07-Nov-2022, Pre QC No. JMBT-22-19482 (PQ); **Reviewed:** 21-Nov-2022, QC No. JMBT-22-19482; **Revised:** 29-Nov-2022, Manuscript No. JMBT-22-19482 (R); **Published:** 07-Dec-2022, DOI: 10.35248/1948-5948.22.14.536

Citation: Chen C (2022) The Role of Microorganisms in Sustainable Agriculture. J Microb Biochem Technol.14:536.

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