

Biofertilizers Algae Between the Present and the Potential for the Future

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Introduction

Utilizing bio-fertilizers to boost soil nutrient content and increase productivity is part of bio-fertilization, a sustainable agricultural practice. The soil microflora has been shown to increase biomass productivity and improve soil fertility, making it an appropriate bio-based fertilizer for pollution-free agricultural applications. Most cyanobacteria are able to fix nitrogen from the atmosphere, but some species, like *Anabaena* sp., sp. *Nostoc*. Additionally, *Oscillatoria angustissima* is known to be an efficient biofertilizer based on cyanobacteria. *Spirulina platensis*, *Chlorella vulgaris*, *Acutodesmus dimorphus*, *Scenedesmus dimorphus*, *Anabaena azolla*, and *Nostoc* sp. are a few of the green microalgae and cyanobacteria that have been used to boost crop growth with success as bio fertilizers. Additionally, one of the most frequently utilized microalgae in bio fertilizer research is *Chlorella vulgaris*. the addition of *Sargassum* sp. seaweed species On both sandy and clay soils, *Gracilaria verrucosa* causes chemical changes that are used as a soil fertility indicator. Additionally, the addition of seaweed conditioner to the soil can increase its organic content, restore normal pH, and lower the C/N ratio. An environmentally friendly bio-based fertilizer made from micro and macroalgae is presented in this review as an efficient strategy for increasing soil fertility. Instead of using organic and inorganic fertilizers, which not only cause human carcinogenesis but also pollute the soil through the accumulation of heavy metals.

Decription

The level of fertility in the soil is a big factor in how well agriculture does. The foundation of organic farming systems is soil health. Fertile soil supports a diverse and dynamic biotic population that helps the soil resist environmental degradation and provides essential nutrients to plants. One of the many elements in soil is heavy metals, but human activities like mining, energy production, fuel manufacturing, electroplating, wastewater sludge treatment, and agriculture have increased their concentration in the environment in recent years. Because they are conservative pollutants, bacteria or other organisms cannot break them down, so they remain in the environment forever. So, their concentrations frequently go above what is permissible in sediments, waterways, and soil. When present in excess, heavy metals like arsenic, mercury, chromium, nickel, lead, cadmium, zinc, and iron are harmful to life. In addition to stunted growth and development, dwarf plant production, leaf yellowing, and lower yield, nitrogen deficiency also reduces plant productivity in a number of other ways. The majority of cropping systems have a recovery efficiency below 50%. Volatilization, leaching, denitrification, and soil erosion also result in significant losses of

applied nitrogen. As a result, the world is in dire need of bio-based fertilizer that is both effective and safe for the environment and can be used in pollutant-free agricultural applications to boost soil production.

Utilizing bio fertilizers to boost the soil's nutrient content and increase productivity is a sustainable agricultural practice known as bio fertilization. Algae, which can be found in almost every terrestrial environment, are the most unique organisms on the planet. They could be used in agriculture as bio fertilizers and soil conditioning agents to increase plant productivity and soil fertility. Soil is a significant habitat for the evolution of soil algae, which are tiny photosynthetic microorganisms that originate in the soil and remain alive for several inches below the surface. It may aid in the development of the soil's characteristics, including carbon content, aeration, texture, and nitrogen fixation. The presence of algae alongside other living organisms in a variety of soil types and states may indicate a healthy soil environment. By controlling the flow of water, the algal growth also helps to prevent soil erosion. In a similar manner, they play a role in the bio-control of agricultural pests, agricultural wastewater treatment, soil reclamation, formation of microbiological crust, and improvement of soil fertility.

This review offers a correct and efficient bio-based fertilizer that is good for the environment and can be used in pollution-free agricultural applications to boost soil production from micro and macro algae. Additionally, it supplies the various kinds of algae that can be utilized to improve the fertility of the soil and eliminate a variety of heavy metals from it

The success of agriculture is largely determined by the soil's fertility. Soil health is the foundation of organic farming systems. A diverse and dynamic biotic population in fertile soil helps the soil resist environmental degradation and supplies plants with essential nutrients. Heavy metals are one of the many elements in soil; however, in recent years, human activities like mining, the production of energy, the manufacturing of fuel, electroplating, the treatment of wastewater sludge, and agriculture have increased their concentration in the environment. They cannot be broken down by bacteria or other organisms because they are conservative pollutants, so they remain in the environment forever. As a result, their concentrations frequently exceed what is allowed in soil, waterways, and sediments. Heavy metals like arsenic, mercury, chromium, nickel, lead, cadmium, zinc, and iron are harmful to life when present in excess. Nitrogen deficiency also reduces plant productivity in a number of other ways, including stunted growth and development, dwarf plant production, leaf yellowing, and lower yield. Recovery efficiency is typically below 50% in the majority of cropping systems. Significant amounts of applied nitrogen are also lost through volatilization, leaching, denitrification, soil erosion, and volatilization. As a result, bio-based fertilizer that can be used in pollutant-free agricultural applications to increase soil production is desperately needed around the world.

Bio fertilization is a sustainable agricultural practice that uses bio fertilizers to increase productivity and soil nutrient content. Algae are the most individual organisms on the planet, and they can be found in almost any terrestrial environment. They have the potential to be utilized in agriculture as bio fertilizers and agents of soil conditioning to boost plant productivity and soil fertility [1-3].

Conclusion

Soil algae, which are tiny photosynthetic microorganisms that originate

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in the soil and remain alive for several inches below the surface, require a significant amount of habitat for their evolution. It might play a role in the development of the soil's characteristics, like its texture, aeration, carbon content, and ability to fix nitrogen. In a variety of soil types and states, the presence of algae alongside other living organisms may indicate a healthy soil environment. The growth of algae also contributes to the prevention of soil erosion by regulating the flow of water. Similar to this, they are involved in the bio-control of agricultural pests, the treatment of agricultural wastewater, the reclamation of soil, the development of a microbiological crust, and the enhancement of soil fertility. This review provides a correct and effective bio-based fertilizer that can be used to boost soil production from micro and macro algae in pollutant-free agricultural applications. Additionally, it supplies the various kinds of algae that can be used to remove a variety of heavy metals from the soil and increase its fertility [4,5].

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