



ALGAE BIOFERTILIZATION AS A TYPE OF MODERN CLEAN AGRICULTURE AROUND THE WORLD / REVIEW ARTICLE

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Article history:	Abstract:
<p>Received: 8th December 2023 Accepted: 7th January 2024 Published: 10th February 2024</p>	<p>Today we need a new and conscious approach to agriculture in order to respect and preserve the environment in which we live, and for a better future, aims to implement this new model day by day. Agriculture plays a fundamental and important role in a person's life, as it provides him with his basic needs of clothing and food, so paying attention to the agricultural sector, developing it, and using modern technological methods is necessary to keep pace with changes global development in the agricultural field, the most important of which is following a sound agricultural policy that is consistent with the requirements of the times despite the FAO's confirmation that the year 1966 witnessed an increase in global production of strategic grain crops by about 7%, the global supply of grains decreased and prices rose by more than 50% in the same year. The fact that we are a consumer society, including strategic food, which means, specifically, that we lack food security. Predictions are that the increase in demand for food will reach 70% in 2030 AD overcoming this bleak picture is possible if we focus on agricultural production with the aim of meeting food needs, this is done through integrated agricultural plans that take advantage of the moderate climate and vast areas of land arable and non-cultivated crops, water, and agricultural modernization techniques to meet the challenges of the future.</p>

Keywords: Environmental Pollution, Biofertilization, Clean, Agriculture

INTRODUCTION:

Biofertilizers depend on the use of natural biological systems to facilitate important nutrients for plants without resorting to harmful chemical fertilizers, with the aim of maintaining the level of productivity of these plants at the lowest possible cost when compared to other fertilizers, while at the same time being free of pollutants to produce healthy, safe and sustainable food. For export, biofertilizers are considered environmentally friendly types of fertilizers, the scope of their use in most countries of the world. Biofertilizers are linked to the role of a number of living organisms that contribute to enriching the soil with plant nutrients. Bacteria, fungi, and blue green algae are among the most important sources of fertilizers (Asif, *et al.* 2018). These organisms play an important role in serving plants by providing nutrients, resisting diseases, or withstanding the bad conditions surrounding plant growth, such as environmental stress in the soil or climate changes (Ajmi, *et al.* 2018). A large number of these organisms are also linked to plants through what is called mutual benefit. Using microbial techniques in producing biofertilizers such as producing large quantities of chemical fertilizers cannot meet the world's need, no matter how much of it is produced, especially if world is going through a food crisis, and the high prices of fertilizers constitute a burden on poor countries, even if they produce them locally. It is not only the economic aspect that makes us avoid using chemical fertilizers, but also the resulting health damage excessive use causes pollution of soil, water and plants and is harmful to animal health and human (Gerten, *et al.* 2020). Biofertilizers are important soil fertilizers as they provide nutrients in a more readily available from plants, in addition to containing substances that stimulate plant growth and contribute to improving some soil properties include according (Guo, *et al.* 2022):

1-Water soluble fertilizers: Water-soluble products are fertilizers containing NPK, completely soluble in water, for use in fertilization and are formulated in an innovative production plant with a drying tunnel under a controlled atmosphere. Using the purest raw materials combined with a high-tech grinding system

allows us to obtain a perfect, homogeneous and soluble product, leaving no residue or impurities that can clog irrigation systems. Thanks to decades of experience we produce many different formulas. In multiple compositions; Free of sodium and heavy metals with acid reaction when free of urea with calcium. And all with the best combination of microelements.

2- Foliar fertilizers: These fertilizers are diluted in water and used for foliar application, as they have high purity and are free of heavy metals, chlorides and carbonates that can burn plants. Special binding and nutrient-carrying molecules are present in all our foliar fertilizers. The use of foliar fertilizers allows the integration of rootstocks and amendments into plant development. This is done by providing nutrients to the leaves, reducing absorption by the roots, and enhancing production potential in terms of quantity and quality.

3- Miso and microelements: The Intermediate Nutrients and Micronutrients line contains liquid and water-soluble products based on intermediates and micronutrients in a chelated and/or complex form of ready-to-cultivate assimilation. The innovative formula of some products, in addition to chelating agents EDTA and EDDHA, provides for the use of organic, natural and biodegradable chelating agents. The formulation agent ensures protection of inorganic ions and high availability of the element for absorption by leaves and roots.

4- Gel fertilizer: These fertilizers contain in the composition the three main elements of plant nutrition (NPK), enriching plants with chelated micronutrients. The gel form allows a high percentage of nutrients per liter of product, and it is completely soluble in water. The high concentration of nutrients in the gel allows the use of a small dose and even a little water to obtain excellent results. Fertilizer units are given by weight by volume (% W/V).

4- Granulated fertilizer: Granular fertilizers are complex fertilizers that contain the three main macronutrients. The colored granules, 2-4 mm in size, are homogeneous with high hardness, and are essential for mechanical distribution of fertilizers. These different formulations are enriched with the key microelements Magnesium (Mg) and Sulfur (S) which are key elements in photosynthesis and protein synthesis.

5- Resistance indicator: The resistance inducers line combinations together elicit or activate the products of plants' natural defenses; In fact, they stimulate the production of metabolites involved in defensive responses to biotic (pathogen and pathogenic) or abiotic (physical or chemical agents) stress in the plant, giving it a higher level of resistance. Its innovative formulation provides a valid contribution as an alternative to traditional technical means in the context of increasingly integrated and sustainable protection.

6- Water and soil correctors: The line of water and soil correctors includes specific formulations that allow you to solve field problems related to the characteristics of irrigation water and/or agricultural soil. Water and soil amendments are particularly recommended to correct bicarbonate in calcareous soils, to increase soil organic matter, reduce soil salinity, and to contain ammonia nitrogen losses to the atmosphere.

7- Raw materials for fertilization: High quality raw materials that are completely soluble and free of any insoluble residue. Pure salts allow fertilization to adjust the nutrient supply according to the specific requirements of each crop.

8- Paper gel: The gel and foliar line includes foliar fertilizers in the form of gels, liquids and highly soluble powders all products are characterized by high purity, solubility and adhesion to the paper surface. The formulations do not include the use of heavy metals, chlorine and carbonates, which can have caustic effects on vegetation. The foliar supply of nutrients is particularly beneficial in cases of reduced root uptake and allows production to be enhanced in both quantity and quality (Pirttilä, *et al.* 2021).

Agriculture, in which chemical fertilizers are used, lead to negative effects on the environment and pose a serious threat to our health humans are in addition to the direct effects of these chemicals on the beneficial microorganisms found in agricultural soil. So he started renewal to guide the use of many pesticides and chemical pesticides and the use of bio-technology farming organic is also known as Agriculture Natural, and is used to treat pesticides bacteria and beneficial microorganisms, cities of Ajdal, provision of healthy food, more productive and high quality, and I want to run out of fuel maintaining a pure and clean environment. This technology includes maximizing the use of useful microorganisms for the purpose of their employment (Smith, *et al.* 2021).

In improving the natural, chemical and biological characteristics of the soil, as it maintains the balance of elements in agricultural lands and converts elements in a soluble and readily available from suitable for plant nutrition (Nikolaisen, *et al.* 2023). They also participate in biological resistance to some pests and diseases vegetarianism, he increase in the use of fertilizers or not, but rather the amount of increase required at summit in 1966, governments committed themselves to halving the number of hungry people by 2015 (Zhang, *et al.* 2019).

The direct relationship between the World Food Summit and the use of fertilizers is evident. Perhaps this means, an 8 percent increase in fertilizer use compared to the current perception of use (Zeki, *et al.* 2019). This increase does not seem like much very, but certainly large in terms of increasing it according to the

number of tons and enhancing the use of fertilizers to reach goals world food increases of 2.7% or more are needed to loss of soil nutrients as unfertilized annual crops place severe stress on the material organic matter in the soil improving the efficiency of fertilizer use is a challenge awaiting the future. Among the possible directions is improving fertilizer use and the efficiency of plant nutrient intake through biological techniques activities rarely address current topics in the fields of biotechnology are related to abiotic stress or biological stabilization for nitrogen (Sponsler, *et al.* 2019). The gains in fertilizer use efficiency may be tangible, even from a purely economical effort, but it is noted that depend on a wide range of factors that determine fertilizer use and applications by farmers cities must have a greater ability to innovate in their fertilizer industries, in order to ensure farmers' harvests, in particular maximize the benefits from available technologies related to crops and fertilizer use, this can be an example new coated-polymer fertilizers may provide better nutrient recovery rates industries must also pay attention to the full cycle of fertilizer application and soil nutrient recovery and beyond that, as long as there is no longer any silence in your hand, the tampering with regard to the nutrients of the cooling, and by a special coincidence(Rashmi, *et al.* 2022), the mineral fertilizers are destroyed one of the specialized institutes in the United States published the results of research that continued ,it was stated that organic agriculture may reduce the rise in the Earth's temperature the greenhouse effect to a large extent, because organic agriculture contributes to reducing the emission of carbon dioxide gas agricultural fields at a rate ranging between 15-28% compared to traditional agriculture organic products are healthier and safer than their counterparts produced by conventional agriculture, for example organic agricultural crops contain 50% more anti-cancer compounds than crops that aim to obtain the highest amount of production by using one or limited types of crops traditional crops(Iwai, *et al.* 2022).

The basic concept of organic agriculture is to produce food in a way that do not harm the environment by avoiding agricultural chemicals such as fertilizers, pesticides, manufactured materials, organic fertilization is considered the cornerstone that must be laid to raise the productive value of the land agricultural crops and reducing environmental pollution resulting from excessive use of mineral fertilizers (Chemical) The Food and Agriculture Organization of the United Nations (FAO) has defined sustainable agriculture as systems of service, maintenance, and preservation of natural resources, taking advantage of the adaptation of means industrial technology to meet the food needs of current humans and future generations(Babafemi, *et al.* 2022). The use of beneficial microorganisms in agriculture (Biofertilizer 1EM) The results of recent scientific studies have confirmed the danger of continuing what is known as industrialized agriculture agriculture, in which chemical fertilizers are used, lead to negative effects on the environment and pose a serious threat to health human. This technology includes maximizing the use of beneficial microorganisms for the purpose of using them to improve characteristics, the natural, chemical and biological aspects of the soil, as it maintains the balance of elements in agricultural lands and transforms the elements , the dissolved and soft form is suitable for plant nutrition, and it also participates in biological resistance to some plant pests and diseases(Ajmi, *et al.* 2018).

It contains a compatible group of beneficial microorganisms that have an active and effective role in improving agricultural soil fertility. It is a safe preparation from a health standpoint, and the basic idea of the 1EM biofertilizer is that the beneficial microorganisms are active present in it works to improve the characteristics of agricultural soil naturally, as these microorganisms perform a group of functions beneficial to soil fertility were conducted to produce microbial fertilizers by selecting microorganisms desired, manufacturing the fermentation system and developing organisms, and using primary sources available locally from the waste of local industrial factories in the production of fertilizers vitality(Tudi, *et al.* 2021).

There are more disadvantages of organic farming like human philosophies and practices, organic agriculture is not without shortcomings and drawbacks, and there are also there are many enthusiasts and promoters of organic agriculture, but there are those who are less enthusiastic and convinced of it, the most important negatives are accompanying organic agriculture is a decrease in production, and in general, the average decrease in production due to agriculture is organic - 10% - 30% compared to traditional agriculture(Godfray, *et al.* 2019). This decrease in production in turn led to the emergence of other problems such as the increase in the prices of organic products, for example, the increase in the prices of grain crops and vegetables organically produced - 75% - 300, which is an unsurprising increase when compared to its conventionally produced counterparts losses resulting from reduced production(Sharma and Singhvi, 2017). Despite the shortcomings, some of which have been addressed, organic agriculture remains a pioneering experience that deserves attention and development in order to achieve the difficult equation of providing food in a way that guarantees the safety of humans and the environment (Granada, *et al.* 2018).

Many environmental benefits, as it prevents the use of artificial fertilizers and pesticides, use of veterinary drugs, genetically modified seeds and breeds, preservatives and radioactive materials with the industrial development taking place in the world, the widespread accumulation of waste in the environment has become a real problem, which many people have called for countries around the world need to take serious measures and enact strict laws to reduce this pollution. Today, different countries of the world are

searching for appropriate means of disposing of discarded waste, whether by destroying it or reusing it in bacterial isolates(Liu and Poobathy, 2021; Jacob and Paranthaman, 2022).

4. CONCLUSION

The increasing need for environmentally friendly agricultural practices has led to the use of bacterial biofertilizers, which are based on beneficial bacteria. They include a variety of bacteria that can support growth and nutrition through various mechanisms, such as supplying nitrogen, including rhizobia, azotobacter, and Azospirilla bacteria, and phosphorus facilitation by phosphorus-facilitating bacteria such as basil. Megatherium and Bacillus polymyxa, as well as biological control bacteria for some plant-pathogenic fungi such as Pseudomonas fluorescens. In this context, reducing the use of chemical fertilizers while increasing the application of biofertilizers and organic fertilizers is a mandatory path to reduce the pressure on the environment derived from agricultural practices. The main aspects of biofertilizer inoculation technology are the use of the appropriate component or components and the composition on which the biofertilizer inoculum is produced, the selection of the appropriate carrier materials for the appropriate organisms and the correct method for inoculating plants, seeds or soil.

Choosing the technology for producing biofertilizer vaccines and the quality of their carrier materials successful application of biofertilizers. Moreover, studying the interactions between plants, soil and different microorganisms and highlighting their relationships determines the best possible ways to exploit them for agricultural purposes. There are some obstacles to the widespread use of biofertilization in the southern regions, including short survival period, lack of suitable carrier materials, sensitivity to high temperatures, and problems in transportation and storage also the problem of dehydration during storage. Preserving the environment and human health by reducing the use of chemical fertilizers and reducing soil and groundwater pollution, which includes using biofertilization. The following executive steps include implementing laboratory experiments and field experiments to test the efficiency of these strains in improving plant growth and yields, selecting the most efficient of these strains, developing studies and evaluating the carriers proposed for use in the production of biofertilizer vaccines, and evaluating the viability of bacteria with single vaccines, multiple vaccines, and mixtures, while carrying out applied studies and research to evaluate the efficiency of vaccines under field conditions. This article contributes to safer agricultural practices and supports sustainable agriculture, food security and environmental protection to limit and reduce the use of chemical fertilizers and pesticides that pollute the environment and are harmful to human health. The use of biofertilizers in agriculture leads to the production of vegetable and fruit crops with good qualities that are in increasing demand today from citizens. Fearing for their health from agricultural products contaminated with chemicals, this in turn will lead to an increasing demand for the use of fertilizers and biocides by farmers and investors in the field of agricultural production, as well as increasing export opportunities for bio-produced compounds to open new horizons and areas for studying new research points related to this field with the possibility of producing.

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