Role of Biofertilizers in Agriculture: A review

Vinayak Ramdas Bagul

Assistant Professor,

Department of Chemistry,

MGV's Arts, Science and Commerce College Surgana, District- Nasik, MH, India-422 211.

Abstract: Application of biofertilizers is key element for the maintaining the high level of soil fertility and crop productiveness that is essential for sustainable agriculture. The overuse of chemical pesticides in agriculture is a major source of concern. As a result, it is critical that alternative, environmentally sustainable methods of plant protection, such as the use of biopesticides should be implemented. The present review highlighted the importance of cyanobacteria and describes types and advantages of biofertilizers for safe and sustainable agriculture management practices.

***Key Words*–Agriculture, biofertilizer, Sustainable, Nutrients**

1. INTRODUCTION

Chemical fertilizers have been used tremendously because constant growth of the human population and the need for more food. The most commonly used fertilizers are nitrogen fertilizers, which provide the ammonium and nitrates that are more important for plants. Conventional agriculture plays an important role for providing the food demands for expanding human population, but it has also resulted in more reliance on chemical fertilizers and pesticides. Biofertilizers hold the soil rich in micro and macro nutrients of every kind through nitrogen attachment, phosphate and potassium solubilisation [1]. Chemical pesticides and fertilizer have seen a sharp rise in use in Indian agriculture in recent years and reaching alarming levels in some areas, with dire consequences for human health and environment and ground water. As a result it is becoming increasingly important to use environmentally sustainable methods of enhancing soil fertility as well as pest and disease control [2]. There is serious doubt about the heavy use of pesticides in agriculture. The issue is particularly serious in view of the growth in pesticides resistance in large pests and the prevalence of pesticide residues in agricultural and dairy products [3].

The use of biofertilizers, which encourage and increase microbiological activity and improve the physical and chemical properties of the soil it can be option to reduce the consumption of chemical fertilizers and saving environmental problems and minimize the risk to human health [4]. Agricultural plays a key role in developing and surviving nations for maintaining quality and quantity of agriculture which is necessary to feed citizens with good quality food. The use of pesticides and chemicals with additives that increases world food production includes modern agriculture technique since they act as rapid food for the plants that make them grow faster and more efficient [5]. Long-term soil and crop management activities such as imbalance use of inorganic fertilizers and pesticides, as well as decreased organic manure additives to the soil, simplified crop rotations and monocultures, the use of heavy machinery and insufficient soil management practices all have a significant impact on soil quality and also deteriorating the physicochemical and biological properties of the soil [6-8].

2. Cyanobacteria: as a biofertilizer

Cyanobacteria are emergent agricultural production microorganisms [9]. Diazotrophs are cyanobacteria that are helpful in the generation of environmental-friendly and cheaper biofertilizers. It controls nitrogen deficiency, increases soil aeration, holds water and adds vitamin B12. Antibacterial and antifungal, cyanobacteria are used in this field. Soil transmitted fungi are one of the main pathogenic agents in cultivated fields [10-14].

3. Types of Biofertilizers

The important types of microbial fertilizers, based on their nature and function, are those which supply nitrogen and phosphorus to the plants.

3.1. Nitrogen Biofertilizer

This type of fertilizers fixes the nitrogen symbiotically

Nitrogen is the most abundant and universal nutrient in the atmosphere, but it remains a limiting nutrient due to the difficulty of its fixation and uptake by plants. But certain microorganisms are able to fix significant nitrogen. They are also classified as free living in the soil, with symbiotic plants. Live without endophytic symbiosis in the rhizosphere [15].

3.2. Potassium Biofertilizers

Potassium is another biogenic macronutrient that is important for plant growth and metabolism of plant cells. Photosynthesis, enzyme activation, protein synthesis, and sugar degradation are all important processes in which potassium plays an important role [16]. Different forms of potassium are found in soil. The total amount of K in soil varies between 0.04 and 3%. Though the majority of soil K (90–98%) is mineral K, it is inaccessible to plants directly [17].

3.3. Phosphorous Biofertilizers

Phosphoric biofertilizer has been taken by soil plants as a phosphate anion as the most common limiting factor for the biological growth and productivity of land plants. Usual phosphorus in soil is mostly insoluble, but the quantity which plants can reach is normally a little of P, unless solubilize by microbes. Bio fertilizers are able to solubilize unavailable and insoluble inorganic phosphate compounds through various microbial strands through the generation of organic acids and phosphatases, which are known as phosphate-solubilizing bacteria, helps increase plant growth and productivity [18].

3.4. Compost Biofertilizers

Biofertilizers are used to improve the compost and enhance compost waste bacterial processes. Cellulolytic fungal cultures, as well as Phosphotika and Azotobacter cultures, are good bio fertilizers for compost. Vermicompost is a 100 percent natural, eco-friendly organic fertilizer that contains nitrogen, phosphorus, potassium, organic matter all of which help to increase yield quality and quantity. Due to use of abuse chemical fertilizer soil loses its fertility. Vermicomposting is the biofertilization method used to make humus with high nutrient content using the metabolism of earth-worms. Organic waste is required for its uses. Organic materials are translated into a substance rich in micro and macro nutrients, which is converted into the digestive tract of worms. A chemical and biologically stable fertilizer is produced based on this method which is most important for plant [19-20].

3.5. The basic benefits of using biofertilizers.

Nutrients that encourage the production of biological activity in soils will mobilize biological fertilizers. With increasing structural quality of soil root growth is increases. The organic soil content is higher than average and promotes mycorrhizal association's growth, enhancing phosphorus accessibility on the ground. Biofertilizers enhance the maintenance of stable concentrations of nitrogen and phosphorus also improved nutrient exchange capability in the soil [21**].**One improved activity that can contribute to maintaining or increasing the organic matter content and improving the fertility of arable soil is the use of bio-fertilizers containing living microorganisms. The benefit of using soil biofertilizers is to enhance radionuclides growth also improve crop water and nutrient absorption, and to neutralize and degrade toxic soil materials to encourage seedling survival efficiency and to make the flora come out shorter [22].

4. Conclusion

Government continuously encouraging use of biofertilizer but biofertilizers still not accepted by most of the farmers. Due to this non acceptance of biofertilizers demand of biofertilizers is low and it prevented major investment. Most of the growers, shopkeepers and farmers do not have specific facility which is required in the storage and use of bio fertilizers. The inputs for sustainable agriculture are considerable in biopesticides and biofertilizers. Use of bio fertilizers did not reach the planned level therefore it is important to evaluate the regional position and status to encourage the use of bio fertilizers for sustainable agriculture.

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