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Biofertilizers: Need and importance in Soybean Crop

Gayatri S. Dhengale and M. S. Darade
Department of Botany, Government Vidarbha Institute of Science and Humanities (Autonomous) Amravati. (Maharashtra).

Abstract
Biofertilizers are a fundamental component of modern agriculture. It is a benefit of current agriculture research. Biofertilizers are used in agriculture to replace conventional fertilizers. Conventional fertilizers, which are composed of domestic garbage and green manure, are less effective than chemical fertilizers. As a result, frequently experiment with chemical fertilizers in the field to promote crop growth. However, it is apparent that chemical fertilizers are harmful to the ecosystem. They contribute to water and soil pollution and can spread cancer-causing chemicals. Furthermore, they may deplete soil fertility in the long run. Therefore, scientist have invented biofertilizers to prevent pollution and make the earth healthier for everyone in a natural way. Biofertilizers comprises microorganisms that encourage an appropriate supply of nutrients to the host plants while also ensuring optimal growth and physiological development. Biofertilizers are made from biological microorganisms with specialized capabilities to increase plant growth and reproduction are utilized. There are various types of microorganisms used in biofertilizers. Fertilizer is an essential component of organic farming and plays an important role in preserving long-term soil fertility and sustainability.
Keywords :- Biofertilizer, crop growth, soil-fertility, sustainability

Introduction :-

Biofertilizer are microorganisms that help plants to grow by increasing the quantity of nutrients. Biofertilizer are defined as preparations containing living cells or latent cells of efficient strains of microorganisms that help crop plants for the uptake of nutrients by their interactions in the rhizosphere. Biofertilizers are active group of organisms belonging to the class bacteria, fungi, and algal contributing fertility to the soil either or individually or in collectively manner promoting growth of plants. There will be some different types of biofertilizers like, *Rhizobia, Azotobacter, Azospirrilum,* etc. Organic farming has arisen as a global priority issue due to rising demand for safe and healthful food, long-term sustainability, and worries about environmental damage caused by indiscriminate pesticide usage. The worlds expanding food demand will eventually need the use of chemical inputs in agriculture; nevertheless, there are niche markets and opportunities in specific crops where organic production can be promoted to exploit the local export market. A crucial part of organic farming are biofertilizers, which are mixtures of living or dormant cells of effective nitrogen-fixing phosphate solubilizing organisms. Applying cellulolytic microorganisms and speed up the microbial processes that affect the availability of nutrients that plants may readily absorb. By atmospheric nitrogen, biofertilizers help to improve soil fertility. Without them, soil

phosphate will be produced in the soil. The normal biological system of nutrition mobilization is actually being exploited by them. A number of writers have studied the function and significance of biofertilizers in sustainable agricultural performance. However, a number of limitations continue to keep the advancements in biofertilizer production technology below satisfactory levels. China is the origin of the cultivation of soybeans. It has been estimated that the first half of the 20th century saw china become the world's largest soybean producer and exporter. After 1950s, soybean production in the USA developed rapidly, and today it is the world's largest soybean producer. Pawar *et al.*, (2011) reported that, in India, Maharashtra is the second largest producer of soybean. The Indian vegetable oil industry is one of the biggest in the world. In addition to its geographical adaptability, it has a very high nutritional value, functional health benefits, and versatile end uses, making it an important agriculture crop. Chemical fertilizers cause many hazardous effects, it also harmful effect on soil fertility and soil pollution. soybean forming with biofertilizer agent is more environmentally friendly alternative against chemical fertilizers and has proven to be the safe for the environment and developing sustainable cultivation method. There are a variety of beneficial soil microorganisms in nature that can help plants to absorb nutrients. Biofertilizers are versatile microorganisms that are packed in some carrier material for easy use in the field and can be enhanced by human intervention. Therefore, the microorganisms are the primary component in biofertilizers.

Todays Need of Biofertilizers:

The over and under-appreciated use of synthetic fertilizers has contaminated soil, contaminated water sources, killed off beneficial microbes and insects, reduced soil fertility, and increased crop disease susceptibility. Because of widening disparity between nutrient removal and supply, soil fertility is being depleted, and environmental dangers are becoming a greater challenge to sustainable agriculture. Additionally, compared to chemical fertilizers, the long-term usage of biofertilizers is more cost-effective, environmentally benign, productive, and accessible to small and marginal farmers.

Possible traits and qualities of certain Biofertilizers :

Rhizobium is a symbiotic member of the Rhizobiaceae family. For oil-seed legumes like soybean it is beneficial. Effective rhizobium regulation of leguminous crops mostly rely on whether a suitable strain of a given legume is available. It colonizes certain legumes roots, forming tumor like growth known as root nodules that serve as ammonia production factories. Rhizobium may fix nitrogen from the atmosphere in a symbiotic relationship with legumes and some non-legume plants, such as parasponia. The presence of legume crops in the field is necessary for rhizobium soil. The population declines when legumes are absent. To reestablish the population of efficient rhizobium strain close to the rhizosphere and speed up N-fixation, artificial seed inoculation is frequently required. For each legume to produce useful nodules, a certain type of rhizobium is needed.

Azospirillum is a heterotrophic associative member of the spiriliaceae family. Apart from their capacity to fix nitrogen, they also generate chemicals that regulate growth. Because

Azospirillum develop and fix nitrogen on salts of organic acids like malic, aspartic acid, they create associative symbiosis with many plants, especially those that exploit the C-4 dicarboxylic pathway of photosynthesis. As a result, it is mostly advised for crops including pearl millet, sorghum, sugarcane and maize. In addition to remaining on the root surface, a significant percentage of the azotobacter that colonizes the roots also enters the root tissue and coexists peacefully with the plants. However, they do not cause any outgrowth or apparent nodules on the root tissue.

Azotobacter are aerobic, free-living, heterotrophic bacteria that are members of the same family. Because of the absence of organic matter and the presence of hostile microorganisms in the soil, the number of azotobacter rarely surpasses that of the soil. The bacterium produces antifungal antibiotics that, to a certain extent, prevent seedling damage by blocking the establishment of many pathogenic fungi in the root region. In uncultivated soils and the rhizosphere of agricultural plants, Azotobacter populations are often low.

The mycorrhiza refers to the roots of fungi. It is a symbiotic relationship between a group of fungi and their host plants at the root system. The fungus benefits by getting its carbon needs from the host plants at the root system. The fungus benefits by getting its carbon needs from the host's photosynthesis, and the host benefits by getting its carbon needs, particularly phosphorus, calcium, copper, zinc, and other elements that are otherwise unavailable to it, thanks to the fungus fine-absorbing hyphae. With the exception of crops of the exception of crops of the juncaceae, Caryophyllaceae, amaranthaceae, polygonaceae, and Chenopodiaceae families, these fungi are associated with most agricultural crops.

Importance of Biofertilizers:

Therefore, using biofertilizers is beneficial since they are more affordable than inorganic fertilizers, have been utilized for many years to meet the soil's nutrients and yield requirements, yet a significant portion of them are harmful to the environment, beneficial bacteria, and all living things. Therefore biofertilizers that are both economical and environmentally benign can be employed. Plant resins, organic waste, and a particular type of microorganism make up biofertilizers. By adding nutrients and increasing the amount of organic matter in the soil, biofertilizers help to improve the physical characteristics of the soil. Because they generate vital nutrients like nitrogen, potassium, phosphorus, and other elements needed for plant growth, the microbes found in biofertilizers are extremely significant. Beneficial hormones that are crucial for the growth and development of plants, including as auxin, biotin and cytokinins. Diverse fertilizers also contain antibiotics which help the plant defend against some pathogens that cause diseases. Additionally, biofertilizers aids in the control of abiotic stress and salinity. Biofertilizers are safe for the environment, affordable, and have potential applications in research, particularly in organic farming. Biofertilizers play an important role in organic farming and sustainable agriculture because they protect crops from biotic and abiotic species and significantly increase crop growth and yield. In order to support sustainable agriculture, it is imperative that we minimize the use of artificial inputs, such as chemical fertilizers, insecticides, and conserve our ecological system.

Advantages of using Biofertilizers:

The following are some benefits of using Biofertilizers:

- They are eco-friendly as well as cost effective.
- Biofertilizers do not show instant results but the result shown over time remarkable.
- As a result their use, the soil becomes more enriched and gradually gets better.
- Biofertilizers emit growth promoting hormones, they increase root multiplication.
- The microorganisms found in biofertilizer help the host plants receive an adequate supply of nutrients, physiology regulated.
- To make complex nutrients available to plants, microorganisms transform them into simple nutrients.
- Additionally, plants can be somewhat protected from soil bond diseases by using biofertilizers.

Conclusion:

Since they fix atmospheric nitrogen, mobilize fixed macro and micronutrients or transform insoluble phosphate in the soil into forms that plants can use, biofertilizers which are crucial to organic farming play a critical role in preserving long-term soil fertility and sustainability. Ten million stones of plants nutrients are currently missing between crop removal and chemical fertilizer supply. Given the expense and environmental effects of chemical fertilizers, relying too heavily on them is not a sustainable approach due to the foreign exchange and local resource cost associated with establishing fertilizer facilities and maintaining production. In this situation, farmers will be able to boost productivity per unit area by using organic manures In terms of soybean research there are major difficulties faced by the farmers in production of soybean yield may be severe drought condition, high cost of chemical fertilizers, ways of plant protection and lack of understanding of scientific and technical knowledge affect on farmers.

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