



International Journal of Advanced Technology & Engineering Research (IJATER)  
International Conference on "Recent Advancement in Science & Technology" (ICRAST 2017)

# BIO- FERTILIZERS- KEY TO SUSTAINABLE AGRICULTURE IN INDIA

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## ABSTRACT

Indiscriminate use of synthetic fertilizers has led to the pollution and contamination of the soil, has polluted water basins, destroyed microorganisms and making the crop more prone to diseases and reduced soil fertility. Bio- fertilizers are one of the best modern tools and a gift of our modern agricultural science. Bio- fertilizers are applied in the agricultural field as a replacement to our conventional fertilizers. In India the availability and affordability of fossil fuel based chemical fertilizers at the farm level have been ensured only through imports and subsidies. Today bio-fertilizers have emerged as highly potent alternative to chemical fertilizers due to their eco-friendly, easy to apply, non toxic and cost effective. nature. Also they make nutrients that are naturally abundant in soil and atmosphere, usable for plants and act as supplements to agrochemicals. This paper underlines achievements/disappointments issues in Indian context and for its future in India emphasizes the need for high degree of innovation and active participation in scientific research and development , public awareness programmes to enhance the extra potential of sustainable agriculture.

**Key words:-** Bio-fertilizers, Organic farming, Crop growth, Sustainability.

## Introduction

Bio-Fertilizers means biologically active products or microbial inoculants, containing living cells or latent cells of efficient strains of micro organisms and help crop plants uptake nutrients by their interaction in the rhizosphere when applied through seed or soil. Use of bio-fertilizers is one of the most important components of integrated nutrient management, as they are cost effective and renewable source of plant nutrient to supplement the chemical fertilizers for sustainable agriculture. Conventional fertilizers contain compost and green manure. Those are not as effective as chemical fertilizers. So framers often try to use chemical fertilizer in the field for crop development. But obviously the chemical fertilizers are not environment friendly. They are responsible for various types of pollution and can spread cancer causing agents. More over, they may destroy the fertility of the soil in long run. Scientist have developed bio-fertilizers to prevent pollution and to make this world healthy in a natural way. Bio-fertilizer contains microorganisms which promote the adequate supply of nutrients to host plants and ensure the proper growth and regulation of their physiology. Only those microorganisms are used which have specific functions to enhance plant growth and reproduction. Several microorganisms and their association with crop plants are being exploited in the production of bio fertilizers. They can be grouped in different ways, based on their function as- N<sub>2</sub>-fixing, P-solubilizing and P- mobilizing bio-fertilizers etc. The  
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role and importance of bio-fertilizers in sustainable crop production has been reviewed but the progress in the field of production remained always below satisfaction in our country, because of various constaints.

## Need of Bio-fertilizers-

At Present, one of the new challenges of the new millennium is to obtain more and more agricultural food production from shrinking per capita arable land. Demand is much higher than the availability. It is estimated that by 2020, to achieve the targeted production of food grain the requirement of nutrient and availability will be deficit of about 4.7% Bio-fertilizers have important and long term environmental implication, negating the adverse effects of chemicals Depleting feed stock and increasing cost of fertilizers, is becoming unafordable by small and marginal farmers, depleting soil fertility due to widening gap between nutrient removal and supplies, growing concern about environmental hazards, increasing threat to sustainable agriculture. Besides these facts the long term use of bio-fertilizers is economical, eco-friendly, more efficient, productive and accessible to marginal and small frames over chemical fertilizers. Bio-fertilizers productions is always demand driven, creation of demand among farmers is one of the most important steps required towards promotion of bio-fertilizers. Bio-fertilizer can act as renewable supplement to chemical fertilizer and organic manures. They have the capacity to produce natural resitance in plants aganists pest

and soil borne diseases, because antibodies are produced and beneficial micro-organisms participate in the soil to increase fertility. Bio-fertilizers require organic manures after being added to soil for their growth and development, as well as for their activity in soil.

## Effect of Agrochemicals-

All modern agricultural practices widely carry on a very different heavy range of agrochemicals including different types of organic and inorganic fertilizers. They washed off from land along with water through irrigation, rain fall drainage, reaching in to various water bodies, where they turn fully to our natural ecosystem, then effect human life in direct or indirect ways, viz-

(i) Vegetables grown in NO<sub>3</sub> rich soil may lead to meta haemoglobinaemia, diseases which lead to various ailments as damage to respiratory and vascular system and even cancer.

(ii) Increasing concern about environmental hazards.

(iii) Fertilizers containing NO<sub>3</sub>, increase the total crop yield but at the expense of proteins, which leads to malnutrition.

(iv) Use of chemical fertilizer imbalances the whole mineral pattern of plant body, viz excessive potassium (K) treatment decreased valuable nutrients in food like ascorbic acid and carotene.

Unavailability of suitable carrier resources constraint, lack of awareness of farmers and quality assurance, faulty inoculation techniques, are few environmental limitation for the application of bio-fertilizers.

## Experimental-

A comparative study has been done to investigate the effect of chemical and bio-fertilizers on growth and yield production. Rice was planted in pots containing clay soil and watered and maintaining regularly over three months period. The study was conducted to assess the potential of bio-fertilizers as viable alternatives to chemical fertilizers. It was discovered that treatment with bio-fertilizers produced plant height with the highest yield of crop. Plants treated with chemical fertilizers produced lowest yield and lowest plant height compared to bio-fertilizer treatment. Maximum plant height 920 cm in 100 days and increase percentage yield approximately 15% over the control with bio-fertilizers treated plants. Chemical fertilizer treated plants was recorded 86.2 cm in the same time period and increase field percentage 8% over the control. The

uptake or accumulation of the macronutrients like N,P,K is the direct reflection of the rice yield production. The bio-fertilizers were better than chemical fertilizers in terms of increasing the number of N-fixing bacteria.

**Table -1: Comparative chart of chemical and bio-fertilizers**

Treatment	Weight of grains [500]	Percentage yield	Increase percentage yield
Without treatment	9.330	100	00
Chemical fertilizer	10.520	108.90	8.90
Bio-fertilizer	11.225	115.57	15.50

## Results

Results indicate that microbial population of soil can be increased by organic matter and their effectiveness can be increased by inoculation with bio-fertilizers. The gain qualities of all plants were less than chemical treated pots, due to early harvesting of plants before they reach maturity. However plants treated with bio-fertilizer had the highest percentage grain yield. Possibility due to the earliest grain development. N<sub>2</sub> seem to be an important factor for growth of plants as indicated in the experiment. It could also due to bio-fertilizers having highest, N<sub>2</sub>- fixation, compared to chemical fertilizers.

Bio-fertilizers contain one or more beneficial bacteria or fungal stains is easy to use and economical carrier material which add, conceive and mobilize crop nutrient in soil. In other word when bio-fertilizers applied to seed, plant surface or soil, colonizes the rhizosphere or interior of the plant and promotes growth by increasing the availability of primary nutrients to the host plant. Organic fertilizers contain organic compounds which directly or by their decay increase the soil fertility.

## Conclusion

Bio-fertilizers production is always demand driven. Creation of demand among farmers is one of the most important steps required towards promotion of bio-fertilizers Organic farming has emerged as an important priority area globally in view of the growing demand for safe and healthy food and long term sustainability and concerns on environment pollution

associated with indiscriminate use of agrochemicals. Bio-fertilizers being essential components of organic farming play vital role in maintaining long term soil fertility and sustainability by atmospheric nitrogen, mobilizing fixed and micro nutrients or convert insoluble phosphorus in soil in to forms available to plants, there by increasing than efficiency and availability. In this context, bio- fertilizers would be the viable option for farmers to increase productivity per unit area and fertility of soil in Indian Agriculture.

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