

Liquid Microbial Consortium for Soil Health

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Editorial Note

The green revolution brought amazing consequences in food grain production but with insufficient concern for agricultural sustainability. The availability and affordability of fossil fuel based chemical fertilizers at farm level in developing countries have been ensured only through imports and subsidies which are largely dependent on GDP of the country. Dependence on chemicals for future agricultural needs would result in further loss in soil health, possibilities of water contamination and calculated burden on the fiscal system. Indiscriminate synthetic fertilizer usage has polluted the soil, water basins, destroyed microorganisms and eco friendly insects, made the crop more susceptible to diseases and depleted soil fertility at the primary levels as of today, which is the main concern of the write up. In this critical context Microorganisms have been emerged as the potential alternative for the productivity, reliability and sustainability of the global food chain. Carrier based biofertilizers has already proved to be the best over the agro chemicals and have been showing the tremendous effect on the global agriculture productivity since the past two decades. Rectifying the disadvantages of the carrier based biofertilizers, Liquid biofertilizers have been developed which would be the only alternative for the cost effective sustainable agriculture. The article focuses on Liquid Biofertilizer Technology providing reliable reasons for their necessity, specificity and emphasizes that *“Use of agriculturally important microorganisms in different combinations i.e. Liquid Microbial Consortium (LMC) is the only solution for restoration of soil health”*.

Even though Biofertilizers are being produced and distributed constantly by private agencies, NGOs, State and Central Government production units for the last three decades, their corresponding usage is not in the satisfactory proportions. To cope with the rising demands for food commodities, serious efforts are being made by the State and Central Governments (under the National Projects) for the sufficient agricultural production by popularizing biofertilizers and making them available to the farmer community. In spite of these efforts, the rate of consumption of biofertilizers is not to the optimum level in comparison with the agrochemicals. The reason attributed is the “non-availability of good and suitable carrier materials” that raises contamination problems and shorter shelf life. To cope with this alarming situation, Liquid formulations (LFs) are being developed that ensure more quality over the conventional carrier based biofertilizers inaugurating a new era in the biological input technology. These liquid formulations facilitate long shelf life (up to 2 years), minimum contamination, carrier free activity, handling comfort, storage and transport convenience, easy quality control, enhanced export potentials and are preferred by the farmer community as well as manufacturers.

Why to Explore Bio-fertilizers?

In order to feed the ever growing populations, the countries have to increase the per unit area productivity. According to United Nations Food and Agriculture Organization (FAO) estimations, the average demand for the agricultural commodities will be 60 percent higher in 2030 than present time and more than 85% of this additional demand will be from developing countries [M. A. Baset Mia]. For over half a century, the world has relied on the concept of increasing crop yields to supply an ever increasing demand of food. Therefore, vertical expansion

of food production is necessary. In order to increase the unit area productivity of agricultural land, the role of different crop nutrients in contributing increased crop yield is vital. Among the crop nutrient, nitrogen as well as phosphorus play an important role in increasing the crop productivity. Further, the nitrogenous chemical fertilizers are manufactured industrially using non renewable petroleum products under high temperature and high pressure. Increase in petroleum cost day by day effects the cost of the chemical fertilizers. In addition, more than 50% of the applied N-fertilizers are somehow lost through different agricultural processes which not only lead to economical loss to the farmers and polluted environment consequently (Ladha et al., 1998).

Feedstock/fossil fuels depletion and increasing fertilizer cost are making marginal farmer unaffordable. Growing concern about environmental hazards, increasing threat to sustainable agriculture are some of the other reliable reasons for the Biofertilizer promotion. However, plant nutrients like N, P, and K are highly essential for plant growth and Metabolism. It is also evident that plants utilizes nutrients in greater amounts from soil in modern intensive cultivation and needs replenishment. Under such conditions Micro organisms offer good alternative technology to replenish crop nutrients [Boraste A]. In agricultural eco-system, microorganisms have vital role in fixing / solubilizing / mobilizing / nutrient recycling. These microorganisms occur in soils naturally, but their populations are often scanty. In order to increase the crop yield, the desired microbes from rhizosphere are isolated and artificially cultured in adequate count and mixed with suitable carriers or as they are in suitable combinations (Microbial consortium) by artificial culturing. These are known as biofertilizers or Microbial inoculants.

Strategies

- Identification and characterization of potential organisms (unexplored) and their effective exploitation in the field of Agriculture is urgently needed.
- Selection and application of suitable bioinoculants with respect to soil nature, Agro climatic condition, crop variety under proper agriculture practices is needed.
- Genotypic study of the strains and molecular characterization of the plant parts is necessary to understand the plant mechanisms.
- Study of Soil texture and compatible studies with respect to microbial interventions.

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- Exploring the novel soil bacteria and maintaining the genomic libraries for future exploitation.
- Identifying, studying the population genetics and preserving the useful endangered species and by advanced bio molecular techniques and bioinformatics tools.
- Suitable combinations of microbial formulations (liquid microbial consortium) with optimized field results are preferable for the sustainable production.
- Soil analysis, crop rotation, organic manure usage, maintenance of proper moisture content, regular sterilization practices are emphasized which are necessary to maximize the biofertilizer efficacy.
- Global standards in the research & development should be maintained during the production and storage of the formulations.
- Development of new strains with enhanced capabilities by genetic engineering techniques and rDNA technology is needed to maintain an eco friendly & sustainable agriculture.
- Constructive awareness and technical support by microbiologists and agricultural professionals must be provided to the Agrarians.

Conclusion

Human has been relying on Agriculture throughout the evolution and would be depending on it for ever. The impact of globalization, transition in the technology lead a negative shade on agriculture in the developing countries and declined the percentage of the farming community drastically resulting in raising demand for food commodities. Growing global population demands the safe and sufficient food for the survival. Soil health has become the greatest

assertion for the scientific community in this ever growing polluted globe. Uncertainty in the agro climatic conditions (edapho-climatic factors), monsoon failures by the priceless human activities, lack of proper awareness among the farming community are the direct causes for the agriculture failure in the developing countries. The raising demand for the fields like food processing, packing industries, ready to eat foods etc., witness the demand for raw materials in agriculture sector. Crises of agricultural land day by day, vertical increase in the cost of agriculture input technologies are leading to transitions in farming community. In such an agro critical scenario, a multifaceted solution for different constraints in agro industry is necessary. It is evident that biofertilizer technology has inaugurated a new era in biological input technology and recorded a tremendous raise in the annual agriculture production particularly in the past two decades. To combat the threat of global food crises, the alternative technologies in the agriculture like liquid biofertilizers are obligatory. Liquid biofertilizer of course have the capacity to replace the traditional chemical fertilizers & Carrier based biofertilizers and plays a major role in restoring the soil health, but a lot of measures in terms of technology, government support, subsidies, and constructive awareness by well trained technicians among the agrarians are emphasized.

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