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Nanofertilizer

(*Keerthipriyadharshini A, Dr. Reeba Jacob and Mr. A Divakaran)
S Thangapazam Agricultural College, Tenkasi, Tamil Nadu, India
*Corresponding Author's email: keerthipriyadharshini2002@gmail.com

Agriculture has evolved in parallel with human evolution. Conventional agriculture demands the regular use of fertilizers, along with traditional agricultural practices, which can tremendously boost the crop growth, the yield, the productivity, and the nutritional value. Hence, chemical fertilizers have played an indispensable role in the growth of modern agricultural practices. Out of the total amount of chemical fertilizers and pesticides applied, more than 50% has been estimated to remain unused as they accumulate in the soil and water bodies through leaching and mineralisation. This includes the need for the development of new and innovative fertilizers that have a very high efficiency. The challenge now lies in developing "sustainable and smart" agricultural advancements for rapid crop production. In addition, the use of nanofertilizers, or "nano-biofertilizers", can reduce the environmental hazard to a large extent.

Synthesis of Nanofertilizer

Nanotechnology involves the synthesis and application of devices by managing and controlling their shape and size at the nanometre scale. It has paved the way and enabled the use of nanostructured materials as fertilizers, termed "smart fertilizer". The efficiency of nutrient use can be improved by applying nanofertilizers that utilise the unique properties of Nanofertilizers. Nanofertilizers that are manufactured from organic and inorganic nanomaterials vary depending on the physical or chemical method that is employed. Metal oxides, such as AgO, MgO, ZnO, and TiO_2, are inorganic nanomaterials, whereas lipids, polymers, and CNTs are organic nanomaterials.

Nanobiofertilizers

Biofertilizers are formulations that enhance the soil productivity with a combination of one or more microorganisms by fixing atmospheric nitrogen, synthesising the growth-promoting substances, and solubilising phosphorus. Therefore, a combination of biofertilizers and nanostructures can be referred to as nanobiofertilizers. The interaction between NPs and microorganisms, the longevity of biofertilizers, and their transport are the three most important aspects of nanobiofertilizers. Silver NPs in biofertilizers have an adverse effect on the biological functions of microorganisms. The stability of biofertilizers in terms of tolerance to desiccation, heat, UV inactivation, and overcoming shelf life is enhanced.

Advantages

- Enhance the nutrient uptake.
- Higher yield.
- Improved resistance to biotic and abiotic stress.

Disadvantages

- Toxic to plants and animals.

- Pollution to environment.
- Accumulation in food chain.

Conclusion

Biofertilizers are the perfect alternative to chemical fertilizers. The chemicals not only harm the soil and its productivity but also harm the living organisms consuming the crops grown on that soil. Therefore, the scientists had discovered the use of microorganisms as fertilizers.

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