



ROLE OF NANO FERTILIZER IN TODAY'S AGRICULTURE

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Introduction: -

Agriculture is always the backbone of many developing countries including India. It is not only providing food but also contribute in country economy. According to 2014-2015 censuses, India's population is almost equal to 1,270,272,105 (1.27 billion), which is really a huge number. That's why increasing the need of food to meet the demand of increasing population. 35-40% of the crop productivity depends upon fertilizer; they may be affected plant growth directly or indirectly. To overcome all these drawbacks nanotechnology (nanofertilizer) can be one of the alternative. That increasing food production in short time with good quality.

In agriculture liquid nonfertilizers are newly introduce fertilizer that increase the crop production within definite time period by increasing fertilizer use efficiency 3 time. Since fertilizers are the main concern, developing nano based fertilizer would be a modern technology in this field. A liquid nanofertilizer provide three major nutrients viz., NPK in equal ratio by spraying either to soil, leaves or in aquatic environment for better availability to plant.

Importance of Nanofertilizers: -

- It is a type of fertilizer that's completely bio source increasing the eco-friendly nature, builds carbon uptake, improves soil aggregation, increases the Nutrient Use Efficiency (NUE) by 3 times and it also provides stress tolerating ability. Irrespective of the type of crop it can be used, that's encapsulated in nano scale polymers, they will also have a slow and a targeted efficient release.
- In comparison with chemical fertilizer its requirement and cost, lesser and cheap. In agriculture found that nitrogen uptake is the main reason for improper yield. Nano nitrogen is the one of the source that increase fertilizer use efficiency by minimizing the losses such as leaching, denitrification and volatilization as well as enough nitrogen remain in soil after crop harvesting for next crop.
- Application of nanofertilizer decrease soil pollution and safe for human as well as soil health. Now a day a new sensor develop that use for identify status of nanofertilizer in plant and soil and deficiency symptoms.

Comparison Between Nano and Conventional Fertilizer: -

Conventional Fertilizer	Nano-Fertilizer
Low crop production efficiency	High crop production efficiency
Low nutrition use efficiency i.e. high amount of ordinary fertilizer is required to fulfill high nutrition demands.	Nano-technology has opened up new opportunities to improve nutrient use efficiency.

Higher dose of conventional fertilizer increase environmental degradation at various tropic levels in troposphere.	It is require in smaller quantity that's why Nano fertilizers minimized environment pollution.
These fertilizers don't having any special properties to release nutrient at required time so it is source of water contamination and eutrophication.	These fertilizers are specially modified so that nutrients release in soil at proper time so no free nutrient for water contamination.

Some Nanofertilizers product



Applications of Nano-Fertilizers

- ❑ It Enhanced fertility and the instinct of self-preservation greatly enhance the productivity, quality and reliability of a crop. This translates into an improvement to three major areas of production:
- ❖ Yields: Nano-fertilizers increase yields by an average of 20%, and observed significant effect on growth in leaf, biomass, fruit and grain separately. For example, in some experiments sunflower grain yields increased by 50% and in cucumber trials yield increases of 25% have been observed.
- ❖ Nutritional Value: Tests show an increase of about 10% in both protein and sugar content of treated plant for most types of crops.
- ❖ Health: It enhance overall health of the plant, making it more resistant to severe weather, extreme atmospheric conditions, allowing the plant to fight disease and prevent infections.

Some Nano fertilizers Present in Global Agriculture Market: -

1. Nano Chitin Salt Fertilizer

1. The high protein of organic material
2. Organic active N, P, K, Ca, Mg, B, Fe and Zn.
3. Marine biological chitin.

Classification: Organic nano fertilizer

2. Lithovit Foliar Fertilizer

Nano Hitec highly activated extremely micronized limestone, penetrates the stomata and seizes CO₂ free inside at the cell membrane.

Classification: Inorganic nanofertilizer

3. Agrocare Enzyme Nano

Organic Liquid Fertilizer.

Classification : Organic/ Chemical liquid nano fertilizers

- A highly-concentrated Nano-Gro that uses as a cutting-edge Agro Nanotechnology to bigger, create stronger, healthier plants and cost effective. The active ingredients of Nano-Gro come packaged in coded sugar pellets. These pellets are dissolved in tap water to create a powerful working solution.
- It is required in small, quantity only one pellet is sufficient for treating 42 kg of wheat seeds or 33 tomato plants. At this rate, one kg of Nano-Gro can be used on enough seeds to plant 3,333 hectares (8,236 acres) of wheat or almost 700,000 tomato plants!.



Recent News and Future of Nanotechnology

Tehran (Inic)-

The first nano-organic iron chelated fertilizer produced by Iranian researchers in the world which is also the first nanofertilizer produced in Iran. The mentioned nanofertilizers have unique features like the ultra-high absorption, the increase of 20% to 200% in production, the increase of 3.5 times in photosynthesis, and an increase of 70% in the leaves' surface area.

Conclusion:-

Nano fertilizers are advantageous over conventional fertilizers as they increase soil fertility and crop quality. Releasing nutrients as per plant requirement, increase nutrient use efficiency and crop production. They Reduce the Soil Bulk Density and Improving Soil Water Holding Capacity, Improving Soil pH and Cation Exchange Capacity and Using Nanoenhanced Materials to Control Soil Erosion. They minimize cost and maximize profit because they are consumed in very low proportions. They are nontoxic and less harmful to environment and humans as compared to conventional ordinary fertilizers.

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