



## Nano Fertilizer: Recent Trends and Advantages in Agriculture

**Kumar Chiranjeeb<sup>1\*</sup>,  
Rajani<sup>2</sup>**

<sup>1</sup>Department of Soil Science, Dr.  
RPCAU, Pusa, Samastipur,  
Bihar-848125

<sup>2</sup>Department of PBG, GIET  
University, Rayagada, Gunupur,  
Odisha-765022



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\*Corresponding Author  
**Kumar Chiranjeeb\***

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### INTRODUCTION

Nanofertilizers are the nano material coated fertilizer having the size range of nearly 1-100nm derived or made from traditional fertilizers, extracted from different plant parts, bulky materials. These fertilizers have advantages over the other traditional fertilizers as the loss of nutrients i.e. volatilization, leaching, denitrification and other losses can be controlled with prolonged supply to the crops, thus increasing the efficiency of fertilizer and ensuring better crop production.

#### Factors affecting effectiveness of Nanofertilizers:

**1. Mode of Uptake or transportation:** - The mode of application like foliar application or soil application that determines the fate of the nano fertilizer. Mostly the Nanofertilizers show more efficiency when applied in foliar mode as absorption by the foliage of the plants have more active absorption rather than absorption by roots.

**2. Materials associated with Nanofertilizers:** Different nano formulations, its preparations, coating on fertilizer materials also affects the efficiency of fertilizers. The suitable formulation with compatible coating materials increase the fertilizer longevity and efficiency.

**3. Properties related factors:** Soil associated factors like pH, organic matter, depth, structure; moisture, texture etc affect the efficiency of nano fertilizer.

#### Types and characterization of nano fertilizer

**1. Solid or powder nanofertilizer:** The solid nanofertilizer is in solid form and it can be characterized by using a scanning electron microscope (SEM).

**2. Liquid nanofertilizer:** Liquid nanofertilizers are in either solution or suspension form in nature and the nanoparticles are estimated by transmission electron microscope (TEM) and highly efficient absorption than solid nanofertilizer.

**Mechanism of nanofertilizer entry**

Nano particles in the fertilizer are in nano range i.e.  $10^{-9}$  meter so these minute particles can enter through foliage parts specially through leaf parts and also through stomata. It can be transported inside the plant cell effectively even can pass through plasmodesmata.

**Factors affecting nanofertilizer absorption through plant tissues**

1. Plant variety or species
2. Growth stages of plants
3. Environmental factors
4. Size range of nano fertilizer particles
5. Stability and efficiency of nano fertilizer
6. The Physical and chemical properties of nano particles

**Advantages**

1. It reduces environment pollution and toxicity, other hazards caused by fertilizers.
2. It increases the efficiency of nutrients in soil and its use efficiency in plants.
3. Reduces the loss of nutrients and increase its use by plants.
4. Reduces the frequent fertilizer application in soil thus helps in improving soil health.

5. Minimizes the cost of operation.
6. Higher crop yield.

**CONCLUSION**

Nanotechnology has emerged as an alternative to the problems of pollutions, toxicity, damages to soil environment, low fertility and deteriorative soil health conditions created by traditional fertilizer application in blind mode, as nanotechnology provided techniques for formulation and development of nanofertilizer in agriculture. Application of nanofertilizer not only elevated the crop yield but also supported soil microbial community at a large scale. The absorption of nanofertilizer in plants are affected by several factors like plant characteristics and environmental factors (Abobatta, 2018), along with it nanofertilizer minimizes the cost of agricultural operations by effective absorption of nutrients and controlling the loss of nutrients.

**REFERENCES**

- Abobatta WF (2018) Over View of Nanofertilizers. *Asian Journal of Ethnopharmacology and Medicinal Foods* 4(4): (17-20).