

Nano Urea in Agriculture

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Introduction:

Nano urea is a recent innovation in fertilizer industries. In India we are using large quantity of fertilizer for agriculture products. During 2022-23 the total consumption of fertilizer is around 63.92 million MT at the level of 11.4.6.1:1 (NPK). In this all-India consumption of urea is around 35.73 million MT. Urea is unavoidable fertilizer in agriculture sector, without urea we can't produce something. we see about nano urea, importance and difference between nano urea & conventional urea.

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Fertilizers in agriculture:

Fertilizer is a artificial substance containing the nutrients/chemical elements that improve growth and productiveness of plants. Fertilizers enhance the natural fertility of the soil. Fertilizer produced in industries. A fertilizer can have single nutrient(simple) element or multiple nutrients(complex). Plant needs macro and micro nutrients, macronutrients include N, K, Ca, Mg, P, and S, Micronutrients include Cl, Fe, B, Mn, Zn, Cu, Mo, and Ni. Plants needs NPK at higher concentration, mainly for Nitrogen, the source of Nitrogen is Urea, chemical name of urea is $\text{CO}(\text{NH}_2)_2$.

Primary nutrients:

Primary nutrients are nitrogen, phosphorus and potassium. These nutrients are required in a higher quantity, Example In rice the blank recommendation of NPK is 150:50:50. But other nutrients are required in a small quantity, it's may be available in soil itself or either plant get it from the FYM and others.

- Nitrogen is absorbed in the form of ammonium (NH_4^+) and nitrate (NO_3^-)
- Phosphorus is absorbed in the form of H_2PO_4^-
- Potassium is absorbed in the form of K^+

Role of urea in plant production:

In agriculture, urea is intensively used as a nitrogen fertilizer. Nitrogen, a crucial ingredient needed for plant development, is abundant in urea. One of the most concentrated nitrogen fertilizers on the market, urea generally contains 46% nitrogen by weight. The administration of urea encourages robust vegetative development in plants, which increases the production of leaves, stems, and biomass in general. Compared to other nitrogen fertilizers, urea is more affordable because of its cheap cost. The effective use of urea in agriculture is more important as the world's population rises in order to fulfil rising food demand. For improve the production and productivity gov of India gives subsidy for urea to the farmer. Actual price of 50 kg urea bag is around 3000rs after subsidy price of 50 kg urea bag is around 268 rs only.

Importance of nano urea in agriculture:

- Nano Urea is cost-effective and required in low quantities.
- It offers cost savings as it is more affordable compared to conventional urea fertilizers.
- The most critical benefit of using Nano Urea for agriculture is its minimal impact on the environment.
- Foliar application of Nano urea liquid results in more efficient nitrogen absorption, better physiological growth, grain production.
- Their targeted application also reduces the need for excessive fertilizer use.
- Nano urea is a potential component of 4 R nutrient stewardship as it promotes precision and sustainable agriculture.
- Nano Urea is produced by an energy efficient environment friendly production process with less carbon footprints.

- Increased availability to crop by more than 80% resulting in higher Nutrient Use efficiency.
- Its application to crops as foliar fertilization enhances crop productivity to the tune of 8% with commensurate benefits in terms of better soil, air and water, and farmers profitability.

Impact of nano urea in agriculture:

- The trials with Nano Urea have shown around an 8% increase in the crop yield.
- This combination of particles helps increase the available nitrogen in the soil, allowing plants to access more nutrients.
- Nano urea helps in minimizing the environmental footprint by reducing the loss of nutrients from agriculture fields in the form of leaching and gaseous emissions.

Cons of nano urea:

Higher initial cost: Nano urea is comparatively much costly than the traditional urea so small and marginal farmer prefer only the traditional urea.

Technical knowledge required: For handling and application of nano urea some technical knowledge is required.

Availability issues: Currently the production and distribution of nano urea is limited only compare to the traditional urea.

Difference between nano urea & conventional urea:

Characteristics	Nano urea	Conventional urea
Year of invention	2021	1823
Particle size	32nm	1nm
Use efficiency	85-90%	30-40%
Price	225/bottle(500ml)	245/bag(45kg)
Storage area requirement	Very less area	Very high area
Effects on soil	Enhance quality	Acidifies soil
Availability in plant	Throughout the life cycle	3-4 days
Intake medium	Direct through leaves	Through roots
Method of use	Only for foliar spray	Soil application as basal and top dressing and foliar spray

IFFCO Nano Urea:

IFFCO Nano Nitrogen has been evaluated and validated according to the, “Guidelines for Evaluation of Nano based Agri Input and Food Products in India” released by the Department of Biotechnology (DBT), Govt. of India. Food toxicity and safety studies of harvested produce by NABLGLP certified labs have also confirmed that IFFCO Nano fertilizers are safe and effectively assimilated inside the plant system with no toxic effect at recommended levels.

Conclusion:

Fertilizers plays a crucial role in plant production, however the organic manures used by farmers that not satisfy the needs of plant .so fertilizers are unavoidable in agriculture, that may increase the environmental pollution, on this way Nano urea supply the nitrogen to the plants and also reduce the environmental pollution. In future nano urea may replace the conventional urea

