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Revolutionary Impact of Nano Urea in World Agricultural Sector

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ARTICLE ID: 039

Introduction

Indian Farmers Fertilizer Cooperative Limited (IFFCO) was established on 3 November 1967, its headquarters located in New Delhi. It is a multi-state cooperative society engaged in the business of manufacturing and marketing fertilizers across the world. Urea is the most important nitrogenous fertilizer in the world because it is content with 46% nitrogen. The world's 1st liquid Nano Urea product was introduced on 31st May 2021, New Delhi, India by Dr. Awasthi, MD, IFFCO Head office new Delhi. In India increased use of chemical fertilizers during 1965-1966 in the green revolution era. Shri Dilip Shangani, Vice Chairman, IFFCO said that IFFCO Nano Urea is a product of the 21st century and it is a need of the hour to keep the environment, soil, air, water safe for future generations while securing food for all. Excessive use of chemical fertilizers decreased soil fertility and creates soil pollution and is harmful to soil micro-organisms. This inspirational step is taken from the call of the PM of India for reducing the use of Urea in the soil. The Nano Urea liquid is indigenously developed by the IFFCO scientists and engineering team at Nano Biotechnology Research Centre, Kalol, Gujarat in the tune of Atmanirbhar Bharat and Atmanirbhar Krishi. Scientists found Nano Urea is very effective and efficient for plant nutrition. This increase & improved plant nutritional quality and productivity. The process of production of liquid Nano Urea plants is developed at three IFFCOs production units at Kolal, Gujarat, & Aonla, and Phulpur (Uttarpradesh). In phase-l, the target annual production capacity of 14 crore bottles and in phase-ll additional 18 crore bottles by the year 2023. These 32 Crore bottles are potentially replaced 1.37 Crore MT of Urea by the year 2023. IFFFCO Nano Urea liquid is now included in the fertilizer control order (1985) based on multi-location trials conducted by different state agricultural institutions and 20 ICAR affiliated universities and KVK centers across the country on 43 crops. The test its efficiency around 11,000

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farmer field trials undertaken more than 94 crops, an average 8% increase in yield has been witnessed.

What is Nano urea?

Urea that is produced from Nanotechnology to improve the efficiency of the nutrients of the crop is called the Nano Urea. The Nano liquid will replace conventional Urea and it can curtail its requirement by at least 50%.

Economic Importance of Liquid Nano Urea

Liquid Nano Urea has great economic importance. Union minister for chemicals and fertilizers Shri. Sadananda Gowda informed by 2023 India will be self-reliant in the production of fertilizers as under the "Atma Nirbhar Bharat" program new fertilizer manufacturing units are being set up with an investment of Rs. 40,000 crore in the country to reduce dependency on imports. Its boost farmers' income and reduced the cost of production. The Nano Urea liquid developed by IFFCOs scientists and engineers will be available in 500 ml bottles. IFFCO has a price Nano Urea at Rs.240 per 500ml bottle for the farmers, which is 10% cheaper than the cost of a bag of conventional Urea. Conventional Urea is effective 30-40% delivering nitrogen to plants, while the effectiveness of the Nano Urea liquid is over 80%.

What are the benefits of Nano Urea liquid?

- The Nano Urea liquid is effective and efficient for plant nutrition, which increases production with improved nutritional quality.
- According to IFFCO, the Nano Urea liquid will also have a positive impact on the quality of underground water, very significant in a reduction in global warming with an impact on climate change and sustainable development.
- Excess Urea caused environmental pollution, harms soil health, and makes plants more susceptible to disease and insect infestation, delayed maturity of the crop, and production loss.
- One 500 ml bottle of Nano Urea liquid would replace at least one bag of conventional urea.
- A sustainable solution for plant nutrition with higher nutrient use efficiency, and reducing soil, water, and air pollution.
- Substantial increase in farmers' income.

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- Due to the small size of Nano Urea Liquid, its bottle can be kept in the pocket and will Significantly bring down the logistics and warehousing cost.
- The size of one IFFCO Nano Urea particle is about 30 Nanometer and when to compare to the conventional urea it has about 10,000 times more surface area to volume size when compared to granular urea." Further, "due to ultra-small size and surface properties of Nano Urea, it gets absorbed by the plants when sprayed on their leaves". Upon penetration, these Nanoparticles reach plant parts where nitrogen is required and release nutrients in a controlled manner.

How IFFCO Nano Urea is environment-friendly?

Loss of nutrients from fields by way of leaching and gaseous emissions have been contributing to environmental pollution and climate change, this can be reduced by the application of Nano Urea which has no residual effect. Urea forms 82 % of the total nitrogenous fertilizers consumed in India and it has recorded an exponential increase in consumption over the years. It is expected that urea consumption will touch 35 million MT during 2020-21. Around 30-50 % of Nitrogen from Urea is utilized by plants and the rest gets wasted due to quick chemical transformation as a result of leaching, volatilization, and runoff, thereby low use efficiency. The excess application of urea contributes to the greenhouse gas in form of nitrous oxide lead to Global Warming. Nano Urea Liquid is an environmentally friendly, smart fertilizer with high nutrient use efficiency and a sustainable solution for curtailing pollution and reduction in global warming in the long run as it reduces the emissions of nitrous oxide and doesn't contaminate soil, air, and water bodies. Thus, making it a promising alternative to conventional urea. Nano Urea Liquid addresses environmental concerns caused currently by conventional urea such as emission of greenhouse gas, nitrous oxide, ammonia emission, acidification of soil, and eutrophication in water bodies. It is required in lesser measure compared to the conventional urea fertilizer to fulfill the plant's nitrogen requirement. Nano Urea has been tested for bio-safety and toxicity as per the guidelines of the Department of Biotechnology (DBT), Government of India, and international guidelines developed by the Organization for Economic Cooperation and Development (OECD) which are adopted and accepted globally. Nano Urea liquid is completely safe for humans, animals, birds, rhizosphere organisms, and the environment at the recommended levels of application.

Conclusion

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IFFCO liquid Nano urea changes the entire agricultural farming system and curtails the total dependency on conventional urea. IFFCO Nano Urea is a giant step towards sustainable agriculture and food systems with a step towards precision & smart farming. IFFCO has also started field trials of the Nano version of DAP fertilizer across the country and maybe it will be launched in upcoming years. It has a great & promising impact on farmer economy and country GDP in upcoming years. This has the potential to revolutionize the entire agriculture Sector across the world.