



# To identify Awareness Level of Nano Urea usage in Agriculture lands of Rajasthan

Pooja Tak<sup>1</sup>, Foumy N Rafeeq<sup>2\*</sup>, Yamini Kaushik<sup>3</sup>

<sup>1,2,3</sup> Assistant Professor, Vivekananda Global University, Jaipur

Corresponding mail: foumy101@gmail.com

## Abstract

Urea is a low-cost form of nitrogen fertilizer with an NPK (Nitrogen-Phosphorus-Potassium). Although urea is naturally produced in humans and animals, synthetic urea is manufactured with anhydrous ammonia. For farmers all around the world, Indian Farmers Fertilizer Cooperative Limited (IFFCO) launched the world's first Nano Urea Liquid. The only Nano fertilizer approved by the Indian government and included in the Fertilizer Control Order is IFFCO Nano Urea (FCO). Liquid nano urea is applied to leaves as a foliar spray. Nano urea penetrates the plant cells through stomata and other openings and is easily absorbed. According to researchers, the plant root system, which serves as a nutrient doorway, is more permeable to nanomaterials (nano-fertilizers) than traditional fertilizers. Stomatal holes in leaves have also been found to facilitate nanomaterial absorption and entrance into leaves. This research points shows data and information relevant to awareness level of nano urea in agriculture lands of Rajasthan especially the districts like Hanuman Gadh, Sri Ganga Nagar, Jaipur and Sikkar, because 80 per cent of the people of these districts belong to farming community.

**Keywords:** Awareness level, Nano urea, Liquid nitrogen, Agricultural lands, IFFCO and Rajasthan.

## Introduction

Urea is a low-cost form of nitrogen fertilizer with an NPK (nitrogen-phosphorus-potassium). Although urea is naturally produced in humans and animals, synthetic urea is manufactured with anhydrous ammonia. Nano urea, which enhances precision and sustainable agriculture, is a possible component of 4 R (right source, right rate, right place and right time) nutrient stewardship. It supports clean and green technologies since its industrial manufacturing requires no energy or natural resources. For farmers all around the world, Indian Farmers Fertilizer Cooperative Limited (IFFCO) launched the world's first Nano Urea Liquid. The only Nano fertilizer approved by the Indian government and included in the Fertilizer Control Order is IFFCO Nano Urea

(FCO). It was created by IFFCO and is protected by a patent. One bottle of Nano Urea (500 ml) may efficiently substitute for at least one bag of Urea (50 kg).

The pace of urea hydrolysis in soil is mostly determined by the impact strength of microorganisms; under ideal conditions, the effects of urase and microorganism are powerful, and urea decomposes. Plants cannot absorb urea if breakdown is significant. As a result, the activity of selecting appropriate urease inhibitors and nitrification inhibitors to control microorganism species such as urase and nitrobacteria can speed up absorption rates while effectively slowing down urea hydrolysis, extending the validity of urea in soil, reducing runoff and pollution, and improving the urea utilization ratio to 30-40%.

Calcium cyanamide is a nitrification inhibitor of certain form. Additionally, calcium has the ability to strengthen crops and fruits while also preventing the rotting of soil blocks. Experiments demonstrate that urea with calcium cyanamide has a damage ratio of 1/4 that of normal urea in soil and water. Nano Urea is an environmentally acceptable, long-lasting, and dependable alternative to bulk nitrogenous fertilizers like Urea. Urea is not only expensive for the manufacturer, but it also has the potential to harm humans and the environment. In addition, nano Urea might be employed to improve abiotic stress resistance. Nano-urea reduces pollutants in the environment and enhances the physiological features of wheat cultivated under drought stress. Experimental trials of Nano Nitrogen were conducted during Rabi/Zaid 2019-20 at 7 ICAR research institutes/state agricultural universities on various crops such as paddy, wheat, mustard, maize, tomato, cabbage, cucumber, capsicum, and onion and found to be agronomically suitable, indicating that nano nitrogen (Nano Urea) can improve farmer's crop yields while saving nitrogen to the tune of 50%. Therefore, to identify the awareness level and economic impact of nano urea in the field of agriculture the materials was collected and analyzed.

### **1. How does Nano Urea work?**

Liquid nano urea is applied to leaves as a foliar spray. Nano urea penetrates the plant cells through stomata and other openings and is easily absorbed. It is easily transferred throughout the plant via phloem from the source to the sink as required. Surplus nitrogen is retained in the plant vacuole and released slowly for appropriate plant growth and development. Ammonia and carbon dioxide were traditional reactants in the production. The ammonia and carbon dioxide were injected into a reactor that is kept at a temperature of 180 degrees.

### **2. How Do Nano-Fertilizers Enter the Plant System?**

According to researchers, the plant root system, which serves as a nutrient doorway, is more permeable to nanomaterials (nano-fertilizers) than traditional fertilizers. Stomatal holes in leaves have also been found to facilitate nanomaterial absorption and entrance into leaves. Scientists used the faba bean (*Vicia faba*) in trials to assess the nanoparticle's ability to permeate the plant system. In comparison to nanoparticles bigger than 1.0 nm

in size, they discovered that nanoparticles (43 nm in size) could enter leaf in significant quantities. It's also been claimed that nano-fertilizers distribute nutrients via plasmodesmata. Carbon nanotubes and silica nanoparticles are effective instruments for carrying and delivering cargo to plants' target sites (nutrients and other vital biochemical). This research points shows data and information relevant to awareness level of nano urea in agriculture lands of Rajasthan especially the districts like Hanuman Gadh, Sri Ganga Nagar, Jaipur and Sikkar, because 80 per cent of the people of these districts belong to farming community as well as meeting the study objectives from a variety of studies.

## Results and Discussions

### Awareness level of farmers about nano urea

The survey was conducted in the four districts of Rajasthan state as majority of the people residing in these villagers are farmers and the following results have been received.

**Table 1: Awareness level of farmers in Rajasthan's district level**

Name of the district	Respondents (n=200)			
	Aware		Unaware	
	Number	Percentage	Number	Percentage
Hanuman Gadh (n = 50)	38	76	12	24
Sri ganga Nagar (n = 50)	41	82	9	18
Jaipur (n = 50)	20	40	30	60
Sikkar (n = 50)	27	54	23	46

From the table 1, it is clear that majority of the farmers are aware of the nano usage and they are using it in their farming progressively. According to the data received, about 76 per cent of the farmers in Hanuman Gadh district are aware of nano urea and they are applying it progressively in fields. Majority of the farmers (82 per cent) in Sri ganga Nagar is also using nano urea. Only 40 per cent of the people in Jaipur are aware of the nano urea and so the usage is also very much low. Sikkar is quite dry and drought prone area where farming is relatively low. About half of the farmers population (54 per cent) in Sikkar are aware of the nano urea.

As a result of the above description, most of the farmers in Hanuman Gadh and Sri ganga Nagar, are cultivating rice, wheat, sugarcane, mustard etc and so their land holdings are also high comparative to Jaipur and Sikkar where farmers holds less land holding and lands are dry and withered.

## Benefits of Nano Urea

- As it uses less energy but level of production is high and reduces the requirement of conventional Urea by 50 per cent and way cheaper than any other source.
- Nano urea improves the crop productivity, soil health, air, nutrient and water quality.
- It reduces the global warming to a good extent because it is an eco- friendly product.
- Trials show that nano urea can enhance farmer's crop yields and save nitrogen to the extent of 50 per cent.
- Emphasizing the financial aspect of the Nano urea, Shri Mandaviya said that apart from direct savings, transportation cost will also come down.
- Direct financial savings, reduction in transportation cost and better production will increase the income of the farmers.
- The storage of Nano urea will also be easy for the farmers.

## Safety & Precautions

- Nano-Urea has indeed been assessed for bio safety and toxicity in accordance with the Department of Biotechnology (DBT) of the Government of India's recommendations as well as OECD international criteria.
- Nano urea is non-toxic and safe for humans and animals; however, it is advised that you use a face mask and gloves when spraying on the crop.
- Keep out of the reach of children and pets and store in a dry area away from high temperatures.

## Conclusion

As a result of the preceding, a biochemical pathway combining urease inhibitors and nitrification inhibitors is an effective biochemical method for controlling urea-N transformation. Prove that urease inhibitors quinhydrone and nitrification inhibitor calcium cyanamide can delay the  $\text{NH}_4^+$  adsorption state in urea hydrolysis, the raising of soil to blood urea nitrogen path for transformation and soil enzymology regulation and control in soil  $\text{NH}_4^+$  amount, inhibition  $\text{NH}_4^+$  oxidation, minimizing  $\text{NH}_3$  volatilization and greenhouse gases  $\text{N}_2\text{O}$  and  $\text{CH}_4$  airborne release, and can increase the nitrogen adsorptive

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