



# Efficacy of Liquid Nano Urea

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## Why in News?

A two-year field experiment on the efficacy of [Liquid Nano Urea](#) by scientists from **Punjab Agricultural University (PAU)** has found a **substantial decrease in rice and wheat yields** when compared to conventional nitrogen (N) fertiliser application.

- The findings emphasize the necessity for further long-term field evaluations spanning 5-7 years to ascertain nano **urea's equivalence to conventional urea** and its sustainability in maintaining crop yields.

## What are the Key Findings about the Efficacy of Liquid Nano Urea?

- **Yield Reduction:**
  - There is a significant decrease in crop yields when nano urea was used compared to conventional nitrogen fertilizers.
  - Specifically, there was a **21.6% decrease in wheat yield and a 13% decrease** in rice yield.
- **Grain Nitrogen Content:**
  - The application of nano urea **resulted in a decline in grain nitrogen content** in both rice and wheat crops.
  - There is a 17 and 11.5% **decrease in grain N content of rice** and wheat, respectively.
  - The lowered grain nitrogen content implies reduced protein levels in the harvested crops.
    - This is a concern in a country like India, where rice and wheat are staple foods providing protein and carbohydrates. Low protein content could impact the population's protein energy requirements.
- **Cost Considerations:**
  - The cost of nano urea formulation was 10 times higher than that of granular urea and will add to the cost of cultivation for farmers.
- **Crop Biomass and Root Volume:**
  - The application of nano urea led to a **reduction in above-ground biomass** and root volume. This decrease in root volume resulted in decreased root-surface area, **impacting nutrient uptake processes by the roots.**

## What is Liquid Nano Urea?

- **About:**
  - It is urea in the **form of a nanoparticle**. It is a **nutrient (liquid) to provide nitrogen to plants** as an alternative to the conventional urea.
    - Urea is a chemical nitrogen fertilizer, white in colour, which artificially provides nitrogen, a major nutrient required by plants.
  - It is developed to **replace conventional urea** and it can **curtail the requirement** of the same by at **least 50%**.
    - It contains **40,000 mg/L of nitrogen in a 500 ml bottle** which is equivalent to the impact of nitrogen nutrient provided by one bag of conventional urea.

- Nano liquid urea was launched in June 2021 by the **Indian Farmers and Fertiliser Cooperative (IFFCO)**.
- **Developed At:**
  - It has been indigenously developed at IFFCO- **Nano [Biotechnology Research Centre, Kalol, Gujrat in line with \[Atmanirbhar Bharat\]\(#\)](#)** and Atmanirbhar Krishi.
    - India is dependent on imports to meet its **[urea requirements](#)**.
- **Application:**
  - This fertiliser is a **foliar spray**, meaning it should **only be used once leaves arrive** on the crops.

## UPSC Civil Services Examination, Previous Year Question (PYQ)

**Q. With reference to chemical fertilizers in India, consider the following statements: (2020)**

1. At present, the retail price of chemical fertilizers is market-driven and not administered by the Government.
2. Ammonia, which is an input of urea, is produced from natural gas.
3. Sulphur, which is a raw material for phosphoric acid fertilizer, is a by-product of oil refineries.

**Which of the statements given above is/are correct?**

- (a) 1 only
- (b) 2 and 3 only
- (c) 2 only
- (d) 1, 2 and 3

**Ans: (b)**

**Exp:**

- The Government of India subsidizes fertilizers to ensure that fertilizers are easily available to farmers and the country remains self-sufficient in agriculture production. The same has been achieved largely by controlling the price of fertilizer and the amount of production. Hence, statement 1 is not correct.
- Ammonia (NH<sub>3</sub>) has been synthesized from natural gas. In this process, natural gas molecules are reduced to carbon and hydrogen. The hydrogen is then purified and reacted with nitrogen to produce ammonia. This synthetic ammonia is used as fertilizer, either directly as ammonia or indirectly after synthesis as urea, ammonium nitrate, and monoammonium or diammonium phosphates. Hence, statement 2 is correct.
- Sulfur is a major by-product of oil refining and gas processing. Most crude oil grades contain some sulfur, most of which must be removed during the refining process to meet strict sulfur content limits in refined products. This is done through hydrotreating and results in production of H<sub>2</sub>S gas, which is converted into elemental sulfur. Sulfur can also be mined from underground, naturally-occurring deposits, but this is more costly than sourcing from oil and gas and has largely been discontinued. Sulfuric acid is used in the production of both Monoammonium Phosphate (MAP) and Diammonium Phosphate (DAP). Hence, statement 3 is correct.
- Therefore, option B is the correct answer.

