Consequences of Nano Urea in Bihar

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Nano Urea was the first breakthrough solution presented by IFFCO to address the problems associated with using urea. Aiming to improve crop yields, enhance soil fertility, and make farmers' lives more fulfilling, IFFCO has been working for farmers for five decades. Ramesh Raliya is the scientist behind nano urea. Since 2019, he has been active in the nationwide trial of nano urea, and has been developing nano urea since 2015. Nano Biotechnology Research Center (NBRC) at IFFCO, Kalol, Gujarat, developed the innovative product.

Nano farming is a promising path to a sustainable agriculture, and nano sized fertilizers are one of the new frontiers. Nano Urea manufacturing provides a simple method to develop nano scale materials for better crop production while minimized agrochemical leaching. Compared to 1 mm urea, Nano Urea (Liquid) contains nitrogen particles that are 10,000 times larger and contain much more surface area (10,000 times more nitrogen particles). As a result of the use of nano urea (liquid), yields, biomass, soil health, and nutrient quality are improved.

Technical specifications

- Major characteristic features of the Nano Urea are as follows: Nano urea prepared by nanotechnology contains nano scale particles of Nano Urea. Particles of Nano Urea have a size between 20 and 50 nanometers on average. Nitrogen makes up 4% of Nano Urea by weight. Nano Urea contains enough nitrogen to meet the crop's nitrogen needs. The use efficiency of this product is better than that of conventional urea. Most plants/crops can benefit from nano urea as a nitrogen source.
- Nano DAP (Diammonium phosphate): Developed by IFFCO it provides nitrogen and phosphorus to plants. Nano DAP (Liquid) has particle size less than 100 Nanometre (nm) which enables it to enter easily inside the seed surface or through stomata and other plant openings. A notable property of DAP is the alkaline pH. DAP also acts as a fire retardant. For example, a mixture of DAP and other ingredients can be spread in advance of a fire to prevent a forest from burning. DAP has chemical formula $(NH_4)_2$ (HPO_4) is one of a series of water-soluble ammonium phosphate salts.

Benefits of Nano Urea (liquid) has manifold benefits

1. More than 50% reduction in conventional urea requirement
2. It is equivalent to one bag of urea when one bottle of Nano Urea (500 mL) is used in place of one bag of urea, while taking up less space and producing more.
3. An eco-friendly product helps to address global warming and to meet UN Sustainable Development Goals by improving the soil, air, and water quality.
4. Cheaper than conventional urea.
5. An increase in farmer income is achieved by reducing input costs.
6. Produces higher crop productivity and greater soil health.
7. The Nano Urea was developed to provide a safer alternative to conventional urea, which can reduce its demand by at least 50%. Nitrogen is present in an amount equivalent to that of one bag of conventional urea, which contains 40,000 parts per million (ppm).
8. Farmers throughout India conducted around 11,000 field trials on more than 94 crops to determine its efficacy. The results showed an average increase of 8 percent in crop yields.
9. Agricultural researchers at 20 ICAR research institutes, State Agriculture Universities, and Krishi Vighyana Kendras have undertaken field trials on 43 crops in order to include nano urea in the government's Fertilizer Control Order.

10. With the new nano urea liquid, crops with improved nutritional quality can be produced more effectively. It may also reduce pollution caused by excessive application of the granular form, which intensifies soil, water, and air pollution in addition to climate change. In addition to being cheaper than conventional urea, the new product reduces the environmental pollution caused by excessive usage of the granular form.
11. There are 30 nanometers of surface area per gram of nano urea liquid particles, which gives the nano urea liquid 10,000 times more surface area than conventional granular urea. Spraying nano urea liquid on plants' leaves can make it more effective since it is ultra-small and has good surface properties.

Challenges for Nano Urea

- A bottle of nano urea is Rs. 10 cheaper than the 45 kg bag of conventional urea that costs Rs. 250. If we include labour cost of spraying then nano-urea costs Rs. 440 per bottle.
- Small and marginal farmers might not be able to adapt to liquid nano fertilizers since spraying equipment is costly and farm holdings are also small.
- For approving any new fertilizer, the Indian Council of Agricultural Research (ICAR) must have data for at least three seasons. Though field trials were undertaken for 94 crops over four seasons, data for three seasons is not available for any single crop.
- Effect of Nano Urea over varied crops in the country is not yet studied.

Urea crisis in Bihar

In October and November, the state received approximately 68% of its allotted urea supply, which means the urea supply was 30% and 36% short, according to Bihar agriculture secretary N. Saravana Kumar, who said the department had increased monitoring and surveillance of urea distribution. It has been reported that urea has been in short supply in Bihar, forcing farmers to purchase the fertilizer at higher prices. According to the government, urea was available for 290-325 for a 45-kg bag, compared to the maximum retail price (MRP) of 266.50. Farmers allege black marketing as one of the main reasons for fertilizer shortage in their respective villages. Apart from the National Fertilizers Limited (NFL), none of the other companies pay rent to transport fertilizers from the racks to the shops because of which it gets challenging to sell urea at a fixed rate, i.e. Rs.266/bag. To compensate for this additional expense, shopkeepers often try to sell fertilizers at Rs.340 or more.

Indian Farmers Fertilizer Cooperative Limited (IFFCO) manufactures 'nano urea', which has been marketed as a fertilizer to farmers in the face of a fertilizer shortage. IFFCO Nano Urea was virtually flagged off from Kalol to Bihar-by-Bihar Agriculture Minister Amrendra Pratap Singh. Bihar's Bettiah district is scheduled to receive the first batch of Nano urea. At present, the Kalol plant dispatches one truck containing 15000 bottles of Nano Urea every day, and within a couple of months, it will dispatch 10 trucks. In addition to saving the Government a staggering Rs 35,000 crore in subsidies, the Kalol plant produces a whopping 6750 tonnes equivalent of urea per day, which would help farmers earn an additional Rs 35000 crore.

The Phase-II expansion of the project will commission four more plants by 2022-23, resulting in an additional 18 crore bottles being manufactured. Nano Urea has been tested on over 11000 locations, 94 crops, and 20 institutes and universities affiliated with the Indian Council of Agricultural Research (ICAR). Crop diversification, doorstep delivery of veterinary services, increase in food grain production, and better agricultural marketing are emphasized in the fourth edition of the agricultural road map launched in Bihar on April 1.

Future Prospects of Nano Urea

Nano Urea is ready to revolutionize farming with its high efficiency and minimal environmental

effect. As farmers grow a high yield of crops at a low cost with this sustainable replacement of fertilizers, their income is likely to increase. It is becoming increasingly common for several Indian states to use sustainable methods to supplement nutrients to crops. One state, Telangana, has pushed Nano Urea on a large scale and has used it extensively. In addition to distributing the product to farmers worldwide, India plans to market the product in the developing world. The Sri Lankan government received 100 tonnes of nano urea recently. During the period when chemical fertilizers were stopped from being imported by the government of Sri Lanka, nano urea became urgently needed. India is leading the world towards a thriving, healthy, and sustainable future with the rest of the world.

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