

RICH⁺ N-RICH NANO

WATER-SOLUBLE NANO NITROGEN FOLIAR SPRAY

Nitrogen reduced to nano-particulate structure – diameter <40 nanometers

Water-soluble paste that can be freshly mixed in water and sprayed – avoids clumping together of nano particles

Easy absorption through leaf pores – stomatal openings are >90 nanometers

4 kgs of RICH+N-RICH NANO replaces 1 ton of urea – easy to transport, very economical

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CAN YOU CARRY 5 TONS OF UREA ON YOUR BICYCLE?



**NOW,
YOU CAN !!**

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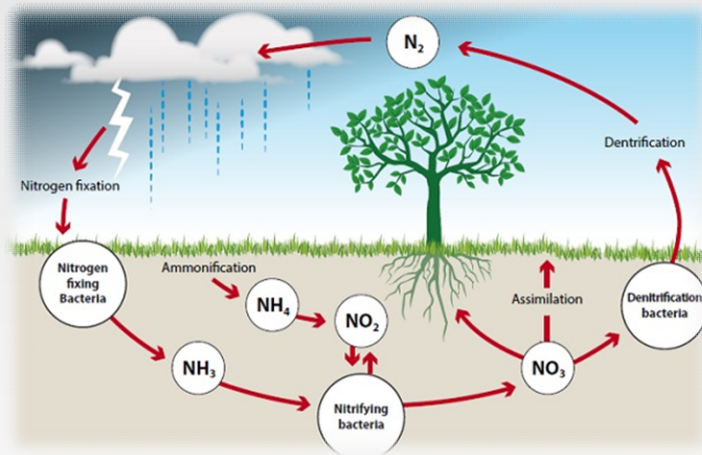
CAN A FARMER CARRY 10 KILOS OF UREA IN HIS PALM?

**NOW,
HE CAN !!**



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PLANTS REQUIRE NITROGEN



Nitrogen is a major component of chlorophyll

It's required by plants to prepare their food

It's also essential for making amino acids which convert to plant proteins

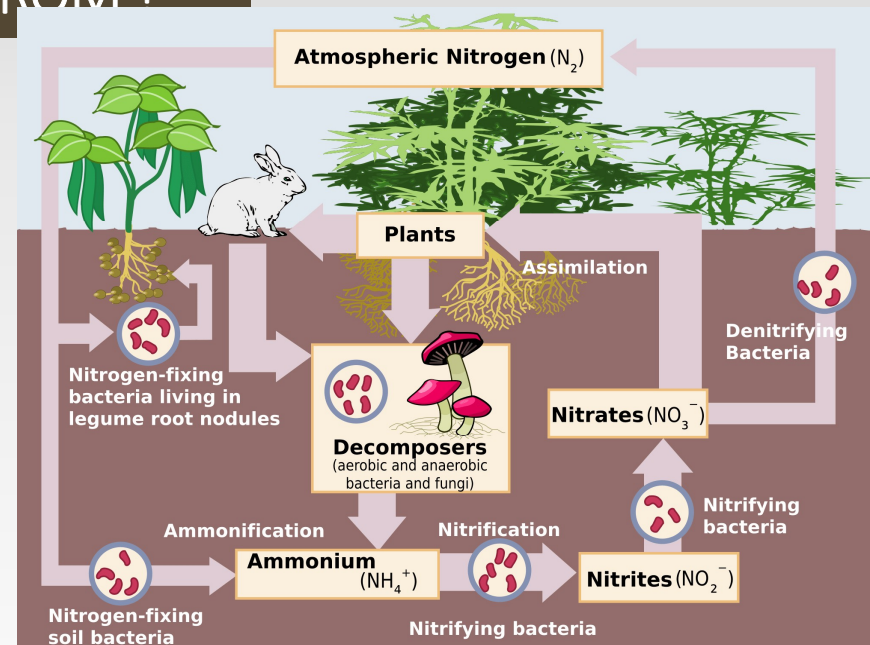
Nitrogen is also necessary for nucleic acids (DNA) which are essential for plant growth and reproduction

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WHERE DO PLANTS GET NITROGEN FROM ?

A lot of Nitrogen is obtained from Nature's elaborate Nitrogen Cycle

But in commercial farming, with emphasis on luxuriant growth and increased output, this is inadequate



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UREA : THE WORLD'S MOST POPULAR NITROGEN SUPPLEMENT



Chemical Formula : $\text{CO}(\text{NH}_2)_2$

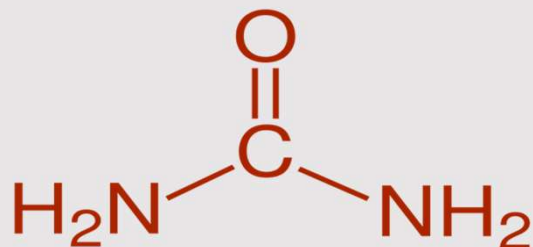
Nitrogen content : 46% N

H₂O Solubility (20 °C) 1,080 g/L

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WHAT IS N-46 ?

CHEMICAL FORMULA



Atomic weight of Nitrogen : **14 x 2 = 28**

Atomic weight of Carbon : 12 x 1 = 12

Atomic weight of Oxygen : 16 x 1 = 16

Atomic wt of Hydrogen :

1 x 4 = 4

Molecular weight of Urea : **28 + 12 + 16 + 4 = 60**

Nitrogen
content in Urea : **28/60 x 100 = 46%**
(Approx)

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WHAT HAPPENS TO UREA IN THE SOIL?

First, enzymes in the soil (urease) or plant residue convert the urea N to ammonia N (ammonification).

Next, the ammonia reacts with soil water to form ammonium N (nitrification).

And finally, through the action of soil microorganisms, the ammonium N is converted to nitrate N.

In the presence of Urease, Urea in the soil gets converted to Nitrates. Some of these are absorbed by the plants. The rest leaches into the soil and gets carried by water to nearby water bodies

In the absence of Urease, Urea gets progressively converted into Ammonia and Carbon dioxide which escape into the air



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HOW MUCH NITROGEN IS ABSORBED BY CROPS?

According to studies, only 30 to 40% of the Nitrogen in Urea gets absorbed

That is, for every 28 gms of Nitrogen available from 60 gms of Urea, only 8 to 11 gms is absorbed. 17 to 20 gms remains unutilised

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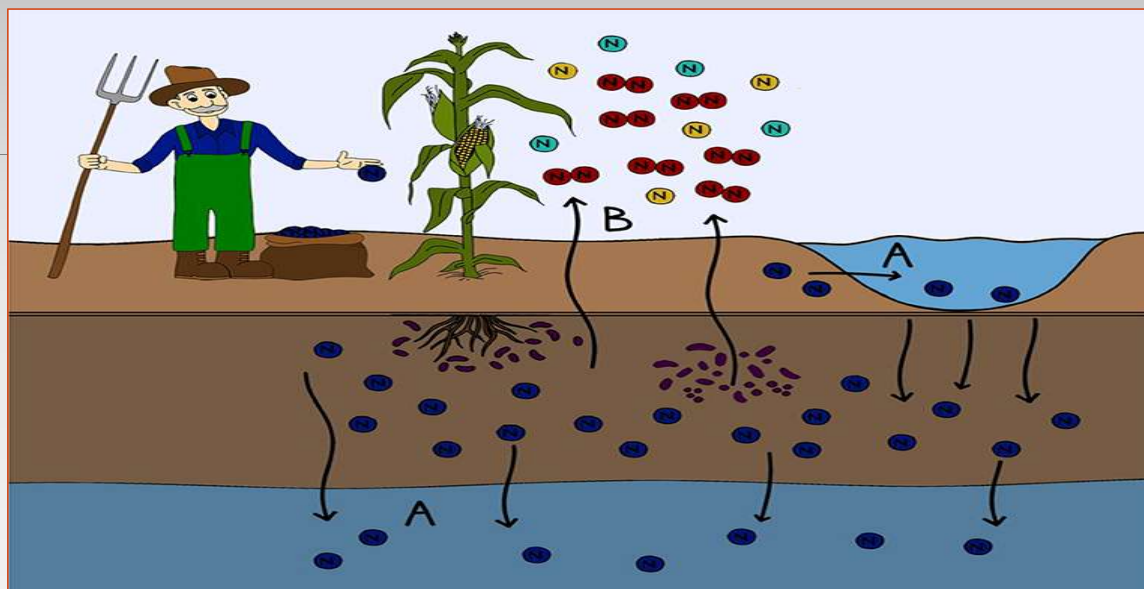
WHAT HAPPENS TO UNUSED NITROGEN?

Unused Nitrogen as nitrates get carried by water to nearby water bodies

In the water bodies, these nitrates become nutrients for undesirable flora like algal blooms. This process is called Eutrophication

Urea converted to ammonia and carbon dioxide (both gases) gets released into the atmosphere

Ammonia and carbon dioxide are greenhouse gases – major players in Global Warming



Nitrogen from fertilizers that is not taken up by plants can be lost from the soil.

(A) Nitrogen leaches from the soil and enters into waterways either above ground (lakes, streams, rivers, or oceans) or into ground water. Nitrogen leaching into aquatic ecosystems can lead to harmful algal blooms and the eutrophication of waterways.

(B) Some microbes transform the nitrogen in fertilizer into nitrogenous gases. These can then be lost to the atmosphere in the form of greenhouse gases.

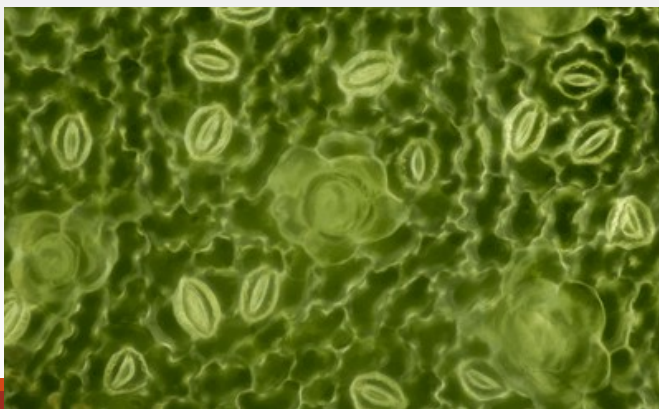
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HOW TO REDUCE UREA USAGE?

MAKE THE SHIFT TO NANO NITROGEN

Smaller particle size – easily absorbed through leaf pores (stomata) when applied as a foliar spray



Very little wastage – gives the plant only what it requires

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ADVANTAGES OF N-RICH NANO



400 ml of RICH+N-RICH NANO (equivalent of 2 bags of urea) can be mixed into 500 litres of water and sprayed over 1 acre of crops

No wastage

No leaching

No eutrophication

No ammonification

No greenhouse gases

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FIELD TRIALS

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GONGHURA FERTILISED WITH UREA



GONGHURA FERTILISED WITH RICH+ N-RICH NANO



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INCREASED INCOME FOR FARMERS



- Reduction in Input Cost
- Higher Crop Yield
- Better Quality of Crop Produce

Field trials indicate an increase in farmers' income

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ENVIRONMENT FRIENDLY

- Agriculture sustainability and environment safety can be ensured with the application of RICH⁺ N-Rich Nano
- Production is energy and resource friendly
- Reduces excess application of bulk urea
- No more volatilization, leaching and run off losses



COST ADVANTAGE

- The cost of bulk manufacture of RICH⁺ RICH+N-RICH NANO would be negligible.
- Being compact in volumes, transportation costs would also be minimal.

India's annual urea consumption is around 35 mln tons

- With RICH⁺ N-Rich Nano, this can be reduced to 1,40,000 tons.

India imports more than 10 million tons of Urea

- With RICH⁺ N-Rich Nano, Urea import can completely stop. Total import substitution.

Government of India spends Rs 1,00,000 Crores for Urea subsidy alone

- With RICH⁺ N-Rich Nano, Urea subsidy can be completely stopped.

Urea production causes natural gas consumption of 60 million metric standard cubic meters

- With RICH⁺ N-Rich Nano, huge savings on fuel consumption.

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THE ADVANTAGE OF NANO TECHNOLOGY

MICRO TECHNOLOGY



- Large particle size
- Poor penetration
- More wastage

NANO TECHNOLOGY



- Nano particle size
- Easy penetration
- Better utilization

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OUR COMPETITOR

IFFCO NANO UREA



500 ml replaces 1 bag (45 kgs)
of Urea

Against claimed particle size of
20 to 50 nanometers, lab
studies indicate particle size of
2019 nm

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WHY DICHOTOMY BETWEEN CLAIM AND REALITY?



Nano-particles in liquid form are generally unstable

Over time, they tend to clump together to form more stable micro-particles

Nano Urea at the time of manufacture may be 20 to 50 nm. But by the time they reach the farmers, they tend to clump together to form larger particles

When the particles grow bigger than 100 nm, they cannot enter through stomatal openings

For this reason, the impact of IFFCO Nano urea amongst farmers is poor

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WON'T RICH⁺ N-RICH NANO HAVE THE SAME PROBLEM?

NO

RICH⁺ N-RICH NANO is a water-soluble concentrate

It breaks into nano-particles only when dissolved in water

Since dissolving in water is done fresh at the site of spraying, there is no time lag and no danger of particulate clumping

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COMPARISON

IFFCO NANO UREA

4% Nitrogen content

Claimed 25 to 50 nanometres particle size

Reality >2000 nanometres particle size

500 ml replaces 1 bag of Urea

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40% Nitrogen content

Claimed <40 nanometres particle size

Reality <40 nanometres particle size

200 ml replaces 1 bag of Urea