



NutriSphere-N[®]

for urea granular fertiliser

Keep nitrogen and your yields where they belong.

More usable nitrogen means better use of your fertiliser investment.



The product is for use only by professional suppliers, blenders, agricultural and horticultural contractors. There is no restriction to the crops it can be applied to.

Verdesian Life Sciences Europe Ltd.



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Up to 60% of applied nitrogen can be lost to the atmosphere as ammonia gas through volatilisation as di-nitrous oxide through denitrification or leached through the soil profile as nitrate into water courses. Applying technologies that can prevent or reduce such losses meets good agricultural practice (GAP).

By stabilizing the nitrogen NutriSphere-N (NN) for granular urea and urea containing fertilisers helps reduce the 3 ways nitrogen is lost to the environment. Therefore it improves the efficiency of the fertiliser applied providing more available nitrogen to the growing plant which gives for a more productive crop and reduces the environmental impact.

KEY FEATURES

NutriSphere-N for urea fertiliser contains 40% wt/wt partial calcium salt of maleic-itaconic copolymer. The formulation has a pH of 2.5.

NutriSphere-N has a high cation exchange capacity (CEC) of 1800 meq/100gm with molecular weight of 3-4000gm/mole. The specific gravity is 1.12 g/ml. The CAS number is 877469-38-0

NutriSphere-N is a patented long chain polymer structure of 30-40 mers, designed to specifically attract multivalent cations of nickel, copper and iron that are in the soil profile and which influence the loss of applied nitrogen.

MODE OF ACTION

Urease Inhibition

NutriSphere-N is a poly-acid polymer with a low intrinsic pH (1-2). Due its high degree of carboxylation it has significant buffer capacity and the ability to interact with divalent cations such as Ni²⁺. NutriSphere-N's activity as an inhibitor of soil urease is therefore due to its ability to create and maintain a low pH environment in the immediate vicinity of the fertilizer. This low pH environment along with chelation/sequestration of the cation nickel denies the bacteria the necessary process involved to produce a functional urease enzyme, meaning less active urease is available and less nitrogen lost through volatilisation.

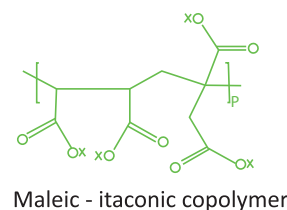
Gas trap experiment Verdesian RTP Lab 2018 Treatment	3 days after treatment, cumulative mg/l of NH ₃ lost	7 days after treatment, cumulative mg/l of NH ₃ lost	16 days after treatment, cumulative mg/l of NH ₃ lost
Urea granular	5.02	12.30	33.09
Urea granular + NutriSphere-N	2.78	9.76	29.05
% reduction in volatilisation as Ammonia (NH ₃) with NutriSphere N in silt loam soil	44.6%	20.7%	12.2%

Reduction of Leaching and Nitrification

NutriSphere-N's high cation exchange capacity means more nitrogen is held in the ammonium form (NH₄⁺), which is plant available and protected from leaching. Also less ammonium-N is released into the two step nitrification process where nitrite and eventually nitrate is produced by specialized bacteria, nitrosomas and nitrobacter. NutriSphere-N is slowing down the activity of both bacteria by sequestering the necessary cofactors copper and iron.

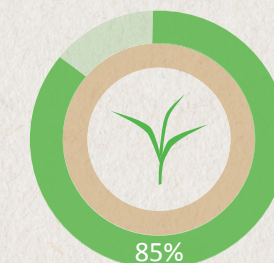


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PRODUCT POSITIONING

As NutriSphere-N improves the efficiency of the nitrogen, the fertiliser can be applied at normal rate which on average provided a 4.9% yield benefit in winter wheat across 5 trials in Germany and France. Where nitrogen restrictions occur Verdesian would recommend using 85% of your normal rate of application, which would bring immediate commercial benefit and equal your normal yield.



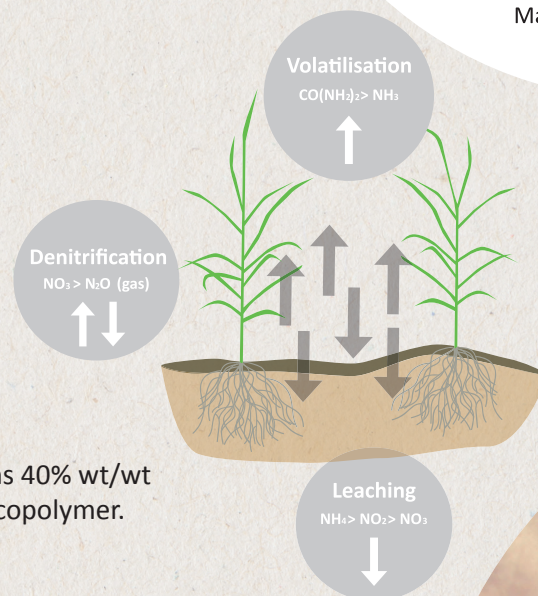
Trail results maize

Number of trials	Yield difference (kg/ha)	Yield difference (%)
239	+ 728	+ 6.1

FIELD PERFORMANCE CRITERIA

NutriSphere-N will protect nitrogen under all field conditions. However from experience, growers will see maximum field benefit when applying their treated urea fertilizer under the following conditions:

- Application to coarse textured soils
- Soils with sub optimal pH, high or low.
- Soils which show a positive response to nitrogen fertilisation.
- Soils which have a low organic matter content.



ENVIRONMENTAL

NutriSphere-N applied with urea fertiliser does not affect soil bacteria, earthworms, other soil life, fish or fauna.

The NutriSphere-N polymer breaks down in the soil to carbon, oxygen, hydrogen and calcium. Due to the size of the molecule it does not get taken up by the plant, therefore there are no residues in the harvested crop.

IMPROVED NITROGEN EFFICIENCY

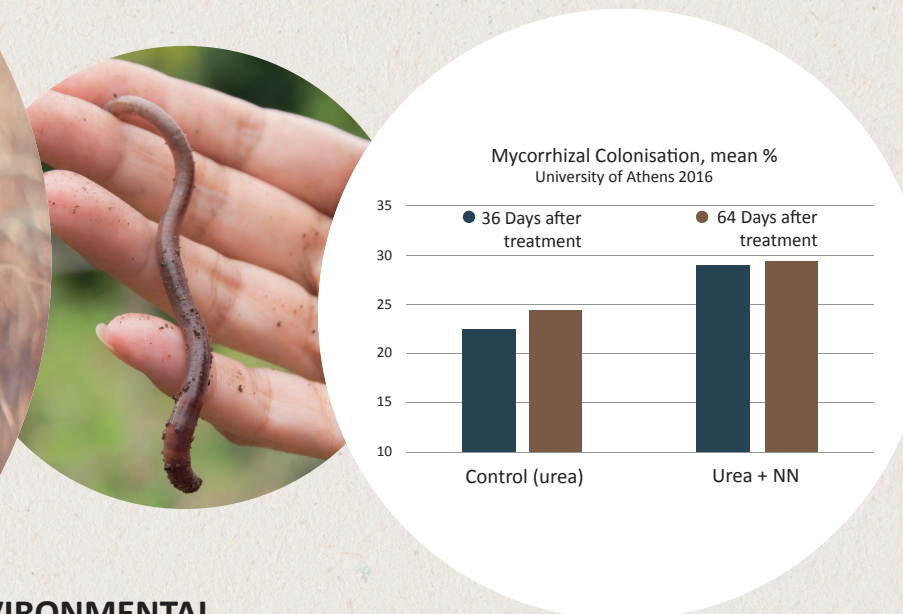
NutriSphere-N plays a significant role in retaining N in the soil profile to enable improved efficiency of applied urea as the UK laboratory leaching study shows:

Soil ammonium -N retained 28 days after application (mg/kg)

Treatment	No fertiliser	Urea	Urea + NN applied
Median Value	0.6	0.7	2.8 (x 4 increase)

Soil available -N retained 28 days after application (kg/ha)

Treatment	No fertiliser	Urea	Urea + NN
Median Value	101.0	197.4	253.8 (+28%)



NutriSphere-N is not a nutrient source or a substitute for fertiliser.

The product has a shelf life of 2 years.

After application the NutriSphere-N will remain fully active over the storage time of the treated urea.

NutriSphere-N - Guide to application, blending and storage

Application – general

- NutriSphere-N (granular) should be used with granular nitrogen fertilisers such as urea
- NutriSphere-N is effective with fertilisers containing carbamide and ammonium-N
- NutriSphere-N is most effective with high-N fertilisers predominantly containing carbamide-N like urea (46% N as carbamide-N).
- NutriSphere-N improves storage and application properties of the urea and also reduces dust formation
- fertiliser bulk blends containing NutriSphere-N treated urea also show improved storage and handling properties

Application rate:

- 2.1 litres / tonne of fertiliser

How to apply:

- use standard application equipment. It is recommended to use 316 grade pumps and attachments for application of the NutriSphere- N. Seals should be made of HDPE®, Gore-Tex®, Teflon™ or Viton®.
 - Dye maybe added to the NutriSphere-N before application – follow dye manufacturer instructions
 - Using a calibrated sprayer apply onto urea fertiliser moving on conveyor belt
 - Immediately after application, the NutriSphere-N treated fertiliser should have mixing process to ensure as much as possible equal distribution across granules
- mixing drum
 - drum must always be filled with fertiliser first
 - NutriSphere-N should be applied by spraying into the moving drum
 - very small batches can be treated by slowly pouring NutriSphere-N into the moving drum
 - Residence time in the drum should be no more than 6 minutes
 - it is not necessary to evenly cover the entire granule surface; however, an approximate equal amount of NutriSphere-N should have impregnated any fertiliser granule.

Drying time:

- treated fertiliser should be allowed to dry
- the typical drying time is ±5 minutes, however,

the actual drying time will depend on

- the fertiliser used
- the degree of moisture in the fertiliser
- environmental conditions, the temperature and relative humidity of the air
- the equipment used and speed of mixing.

- Additives such as dyes can change drying time

Curing:

- after treatment of urea, a curing time of 24 hrs should be allowed
- bulk: to cure leave treated fertiliser overnight in a bin
- big bags can be filled directly after treatment, however, should be left open until the next day

Storage:

- NutriSphere-N stores indefinitely without deterioration, however, containers should be kept in a cool, dry, clean place and protected from direct sunlight.
- Storage properties of NutriSphere-N treated urea are improved over non-treated.
- After application NutriSphere-N will remain fully efficient over the storage time of the treated urea.

Making bulk blends:

- before blending with other components
 - always treat the urea first and have it dried and fully cured before it is used in a blend. NutriSphere-N treated urea behaves as good as or better than untreated urea.
 - Avail treated phosphate fertiliser can be used in a blend containing cured urea treated with NutriSphere –N.
- as in any bulk blend the type and quality of the blending components may influence the properties (storage, shelf life, application) of the made blend.

Blending urea with sulphur containing components:

- when blending urea with sulphur containing fertiliser like sulphate of ammonia (SA) special attention should be given to using dry components and maintaining a dry environment.
- NutriSphere-N treated urea must be fully cured before mixing into a blend containing sulphur
- It is recommended that storage time of sulphur containing blends should be kept to a minimum.

Cleaning:

- After application, cleaning down of equipment with water is recommended as NutriSphere –N is readily soluble in water

Safety and disposal:

- Read instruction on product label before use. Wear protective clothing to avoid contact with skin or eyes or breathing in mist from sprayer. Observe local laws regarding disposal of containers.
- Do not apply NutriSphere-N for granular urea into liquid N fertiliser (UAN) or seeds. The product is for use only by professional suppliers, blenders, agricultural or horticultural contractors .
- There is no restriction to the crops the treated fertiliser can be applied to but always observe any local regulation.

HAZARD STATEMENTS

- H317 May cause an allergic skin reaction.

PRECAUTIONARY STATEMENT

P261	Avoid breathing mists/vapours/aerosols.
P280	Wear protective gloves/protective clothing.
P302 + P352	IF ON SKIN: Wash with plenty of water and soap.
P333 + P313	If skin irritation or rash occurs: Get medical advice/attention.
P363	Wash contaminated clothing before reuse.
P501	Dispose of the contents/container in a collection centre for dangerous goods and hazardous waste in accordance to local, regional, national and/or international regulations.



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