

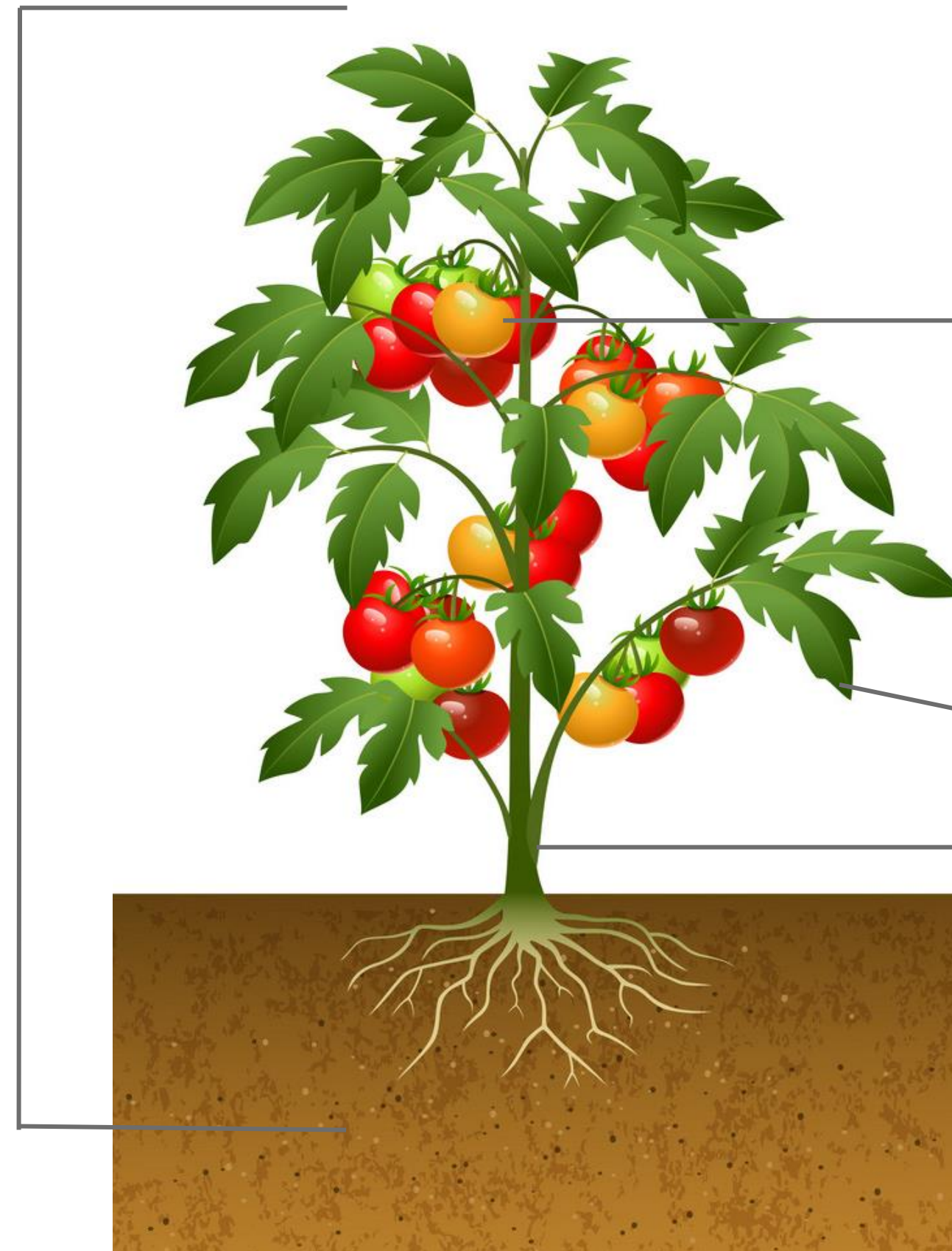
# N KEEPER TECHNOLOGY QUESTIONS & ANSWERS

June 09, 2021



Nitrogen is part of the NPK triad that make up the vital macronutrients for plants.

Potassium (K):  
Overall health  
and growth



Phosphorus (P):  
Flower, fruit and  
root growth

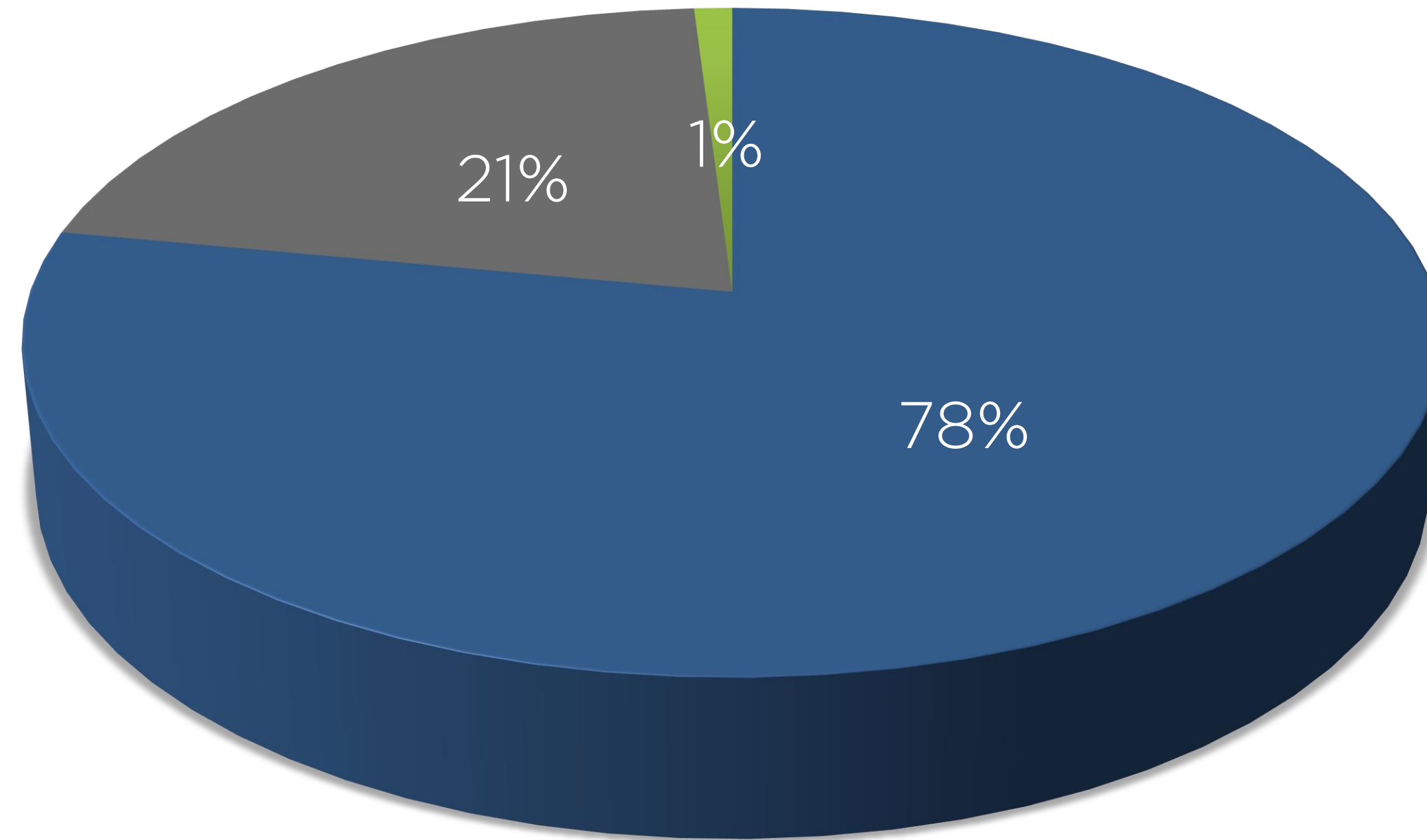
Nitrogen (N):  
Green growth



Essential building block for amino acids, proteins, and DNA.

Important for plant growth, metabolism,  
and chlorophyll synthesis.

# Composition of inhaled air

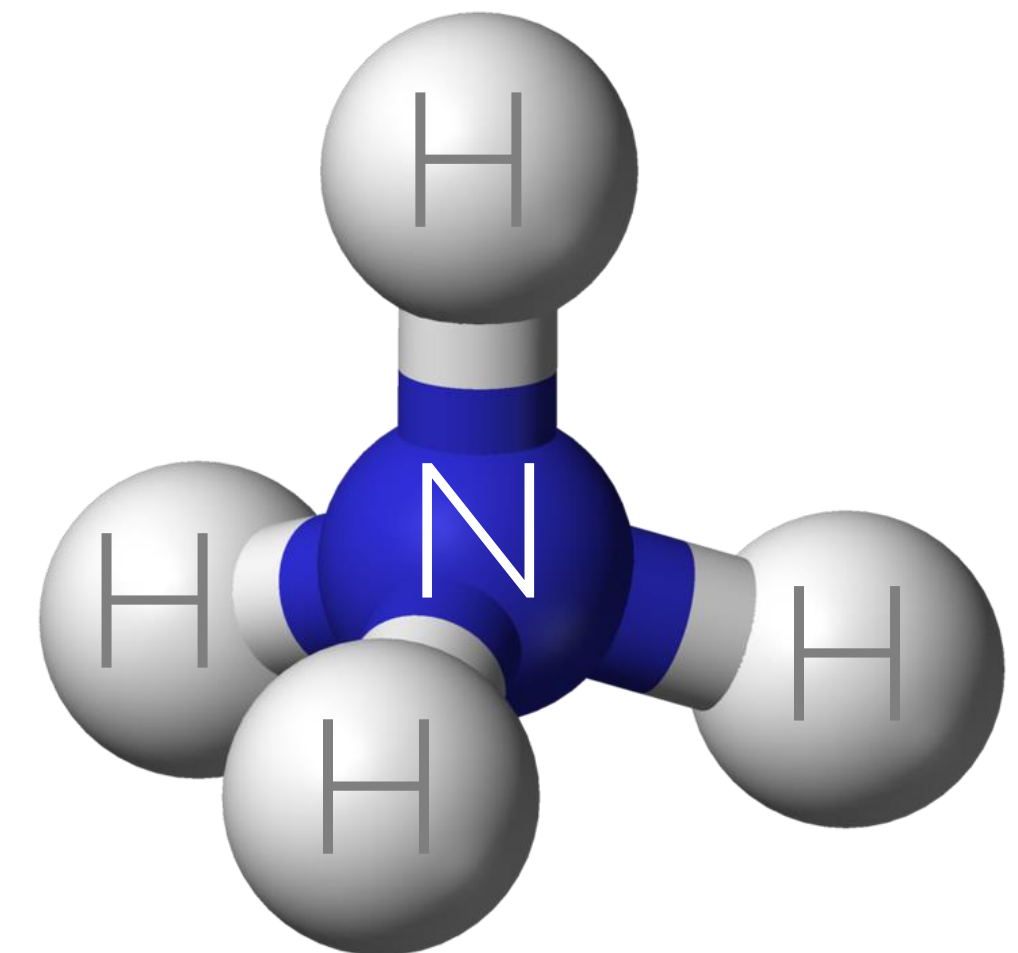
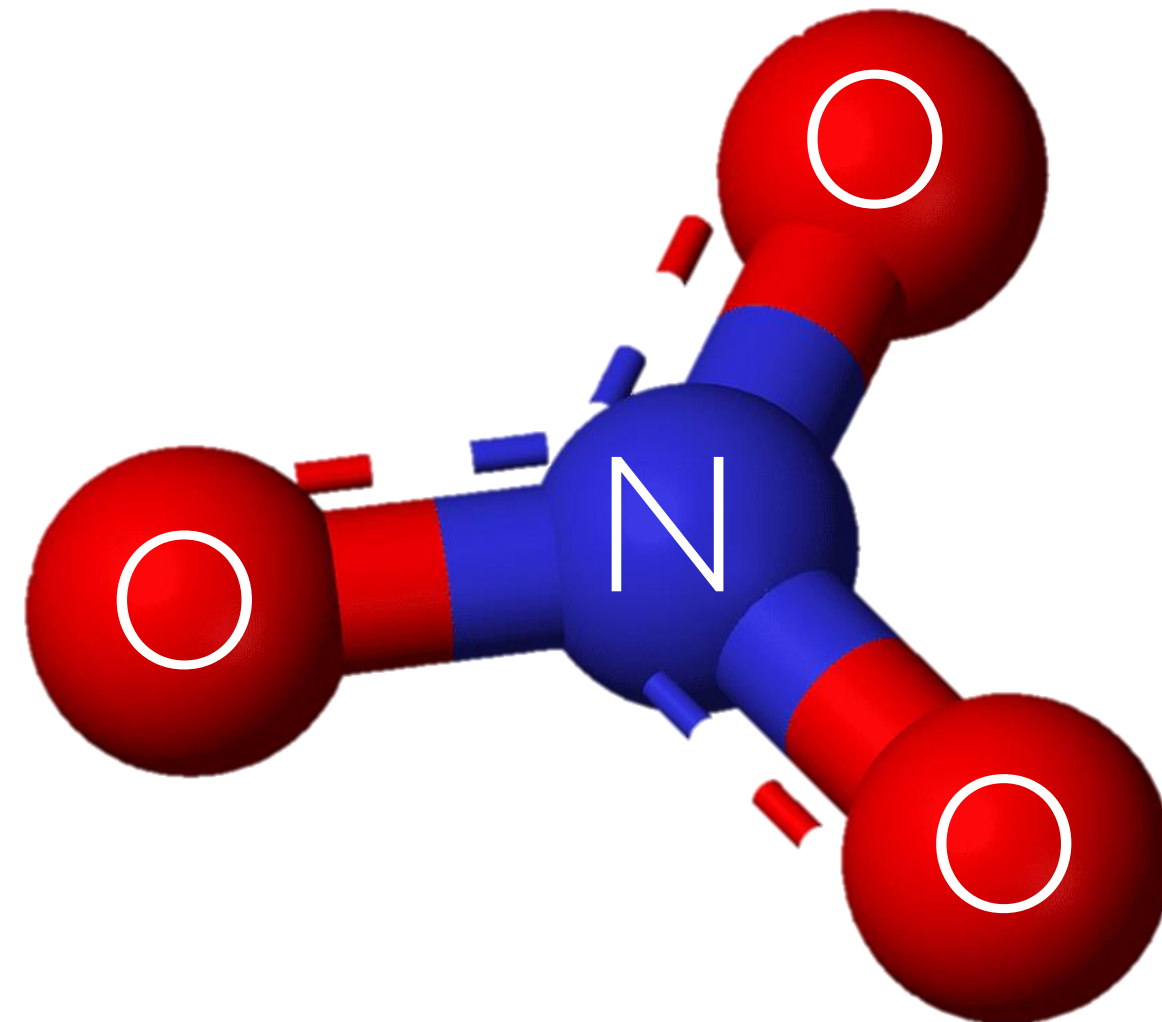
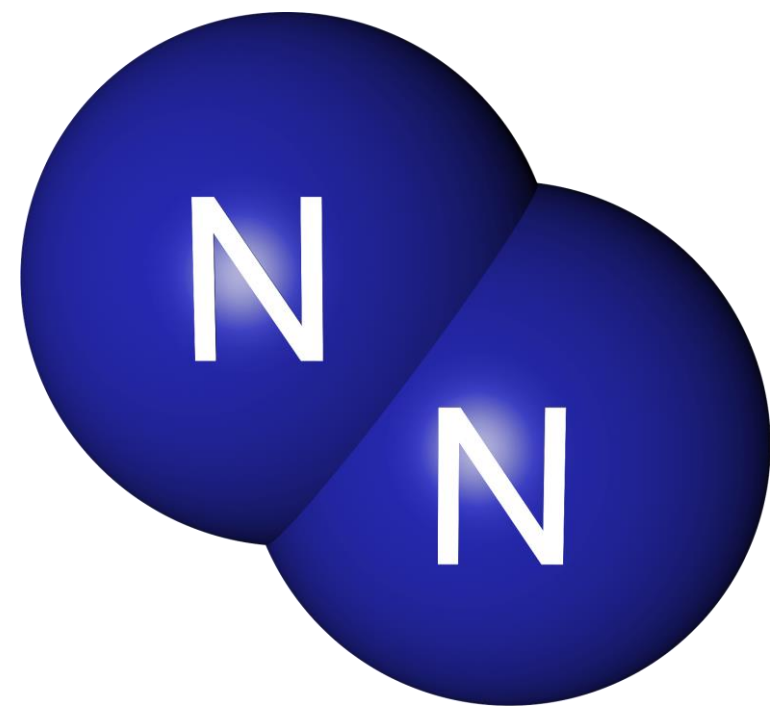


■ Nitrogen   ■ Oxygen   ■ Others



However, atmospheric nitrogen is not in the same  
than **synthetic nitrogen** used for plant nutrition:

Nitrate ( $\text{NO}_3^-$ ) or ammonium ( $\text{NH}_4^+$ ).



Production of synthetic nitrogen fertilizers  
=  
Source of greenhouse gas (GHG) emissions

Fertilizers Europe has commissioned a tool for estimating the carbon footprint related to the production of selected fertilizer products.

Producing 1 tonne of urea = 0.84 tonnes of CO<sub>2</sub> equivalent

**Total urea footprint in LatAm<sup>1</sup>:**

1.746 tonnes of CO<sub>2</sub> per tonne of urea

<sup>1</sup>All emissions with GWP (Global Warming Potential) are included. The calculator includes direct and indirect emissions from all materials related to the production of the particular final product delivered in the final product storage at the production site. The Calculator also includes the estimated emissions related to exploitation and transport of energy from the source to the user.

Source: Antione Hoxha; Bjarne Christensen. THE CARBON FOOTPRINT OF FERTILISER PRODUCTION: REGIONAL REFERENCE VALUES. International Fertiliser Society. 2018..

[https://www.fertilizerseurope.com/wp-content/uploads/2020/01/The-carbon-footprint-of-fertilizer-production\\_Regional-reference-values.pdf](https://www.fertilizerseurope.com/wp-content/uploads/2020/01/The-carbon-footprint-of-fertilizer-production_Regional-reference-values.pdf)

Application of synthetic N fertilizers

=

The most important factor contributing to **direct nitrous oxide (N<sub>2</sub>O) emissions** from agricultural soils



$$\text{N}_2\text{O} = \text{CO}_2 \times 298$$

Global warming potential

over a 100-year timeframe

Up to 75% of the total GHG emission in crop production stemmed from the use of **Nitrogen fertilizers**.



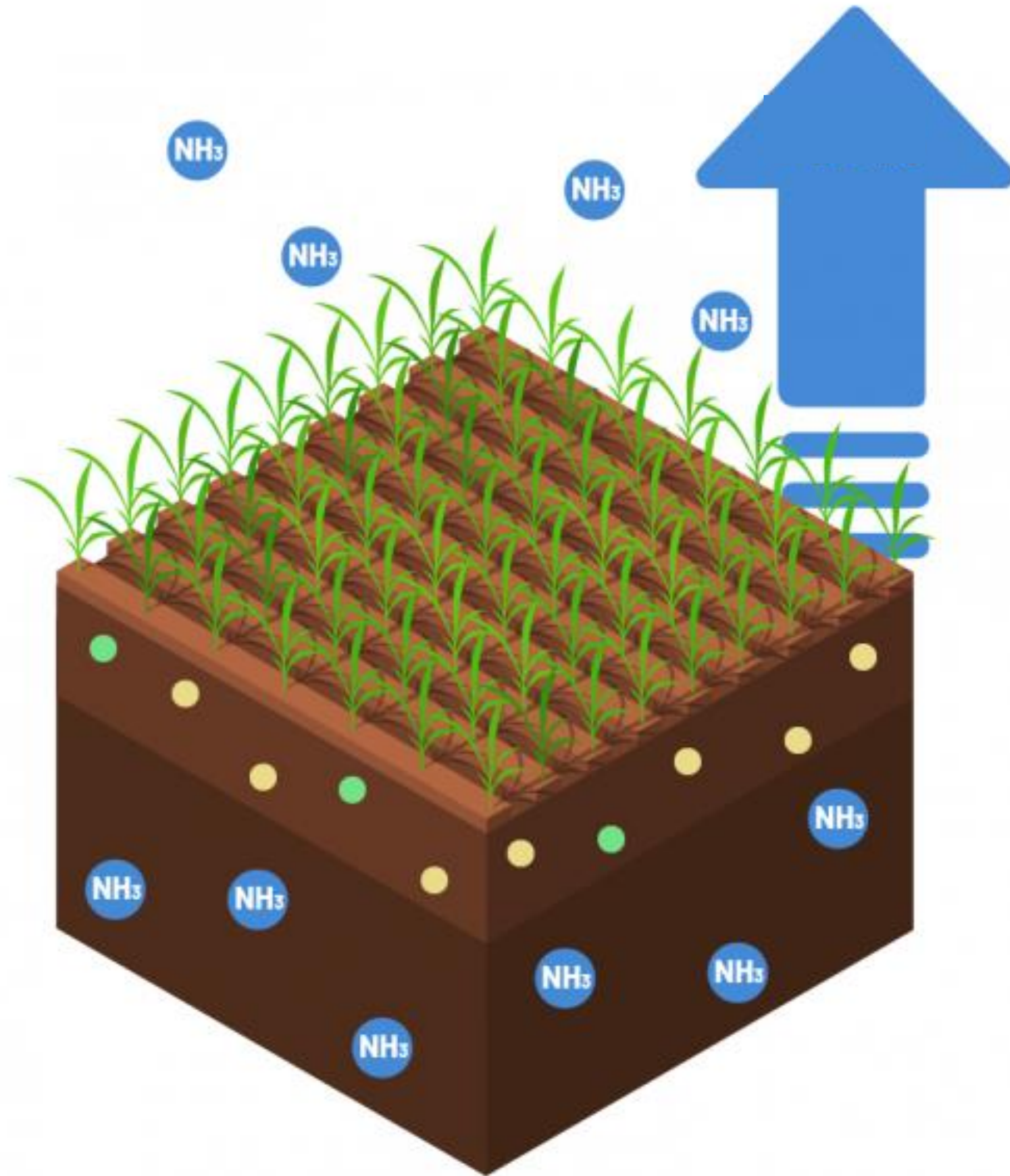


**Global  
NEWS**

**2:38**



The main source of Nitrogen in Brazilian agriculture is **urea**.

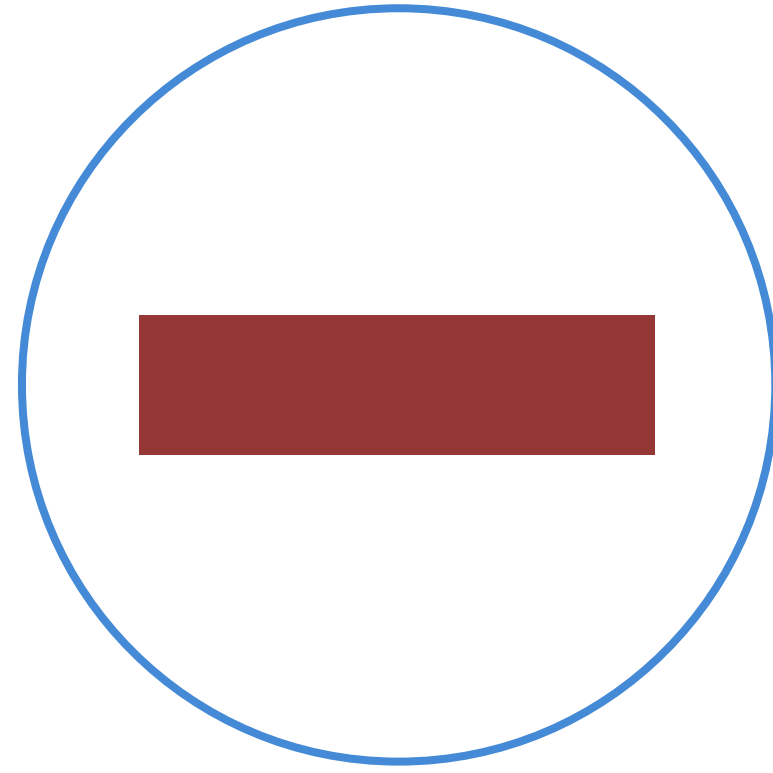


But, despite that, urea has **low use efficiency** under field conditions due to its **high susceptibility to losses**, mostly caused by the ammonia ( $\text{NH}_3$ ) volatilization.

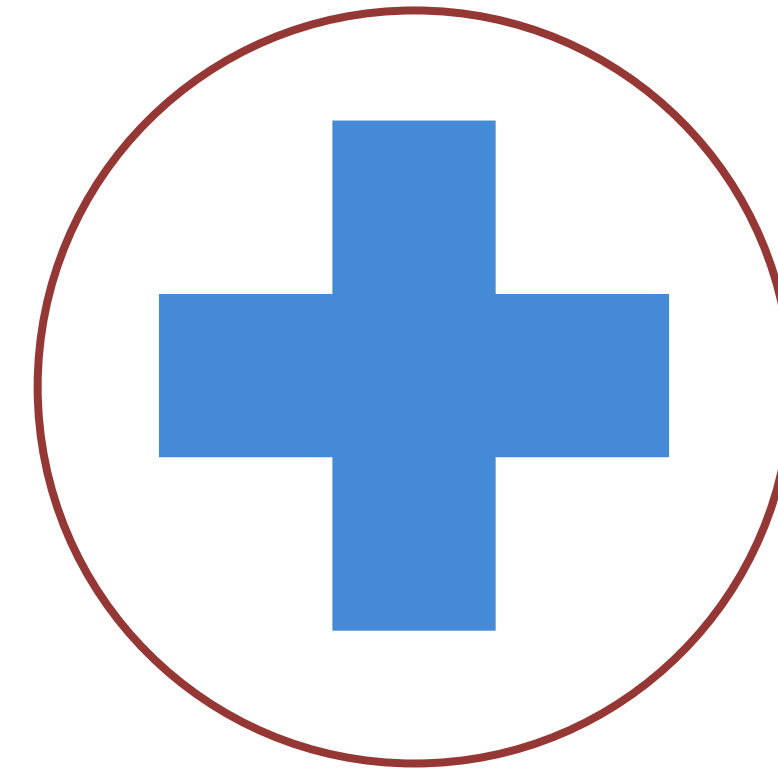




Proprietary **processing technology** for glauconitic siltstone that alters its physical-chemical properties to **enable ammonia retention** for use as a calibrated additive in nitrogen fertilizers.

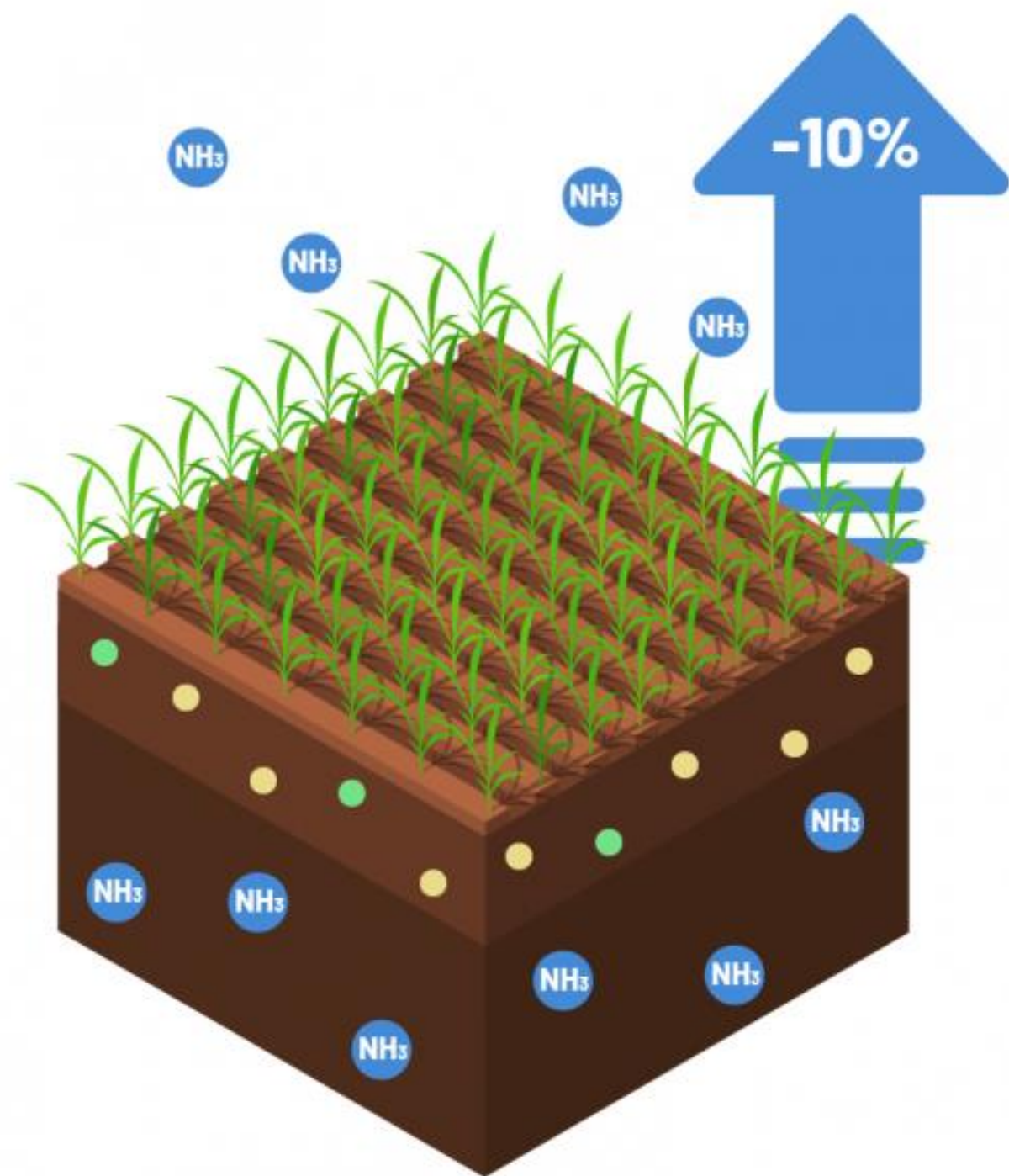


It accentuates the negative correlations in the glauconite grains, indicating cationic substitutions giving to the mineral the characteristics of an anion.

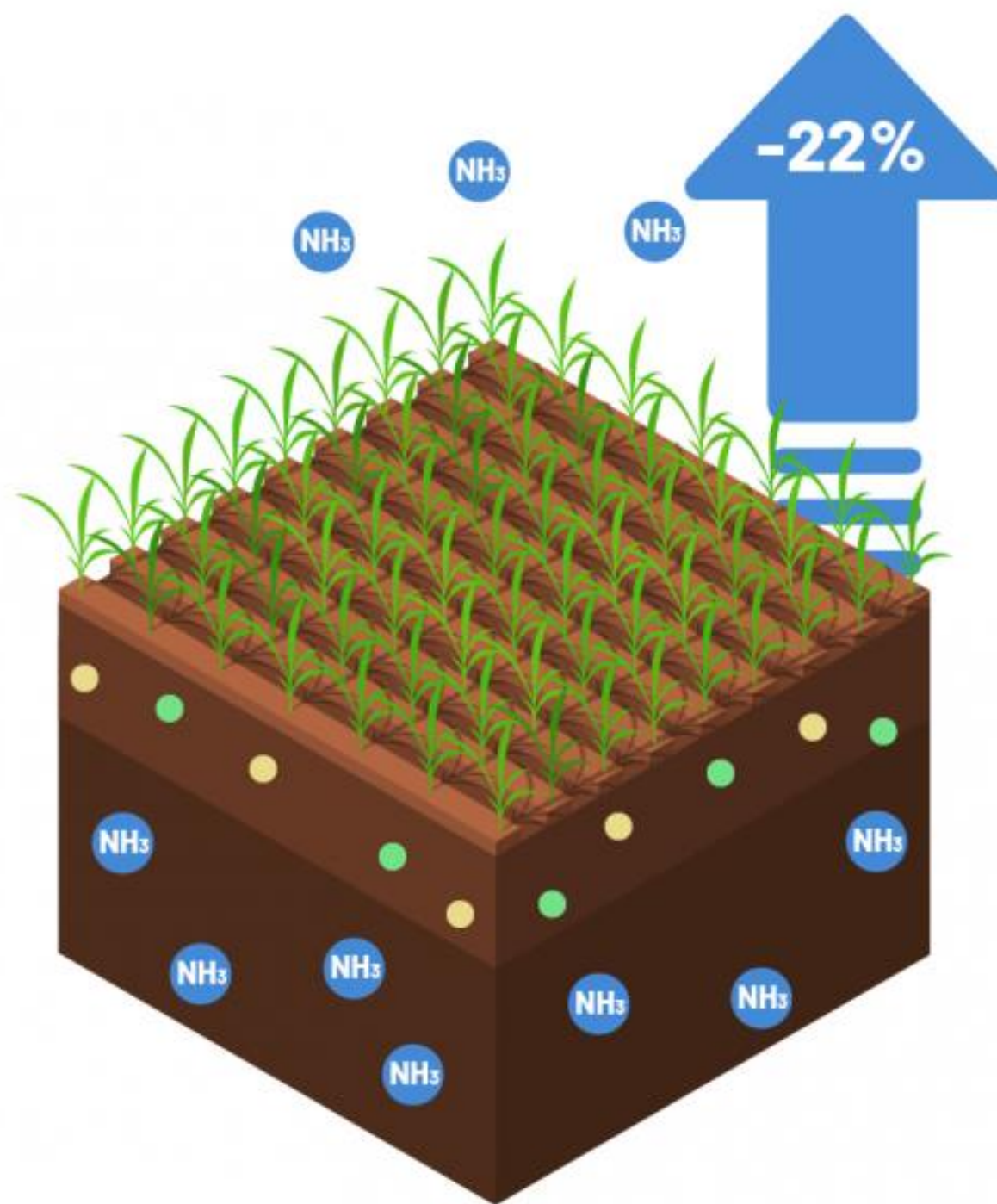


These unbalanced anions allow cationic exchanges between the potassium present in interlayers of glauconite with  $\text{NH}_4^+$  ions present in the soil.

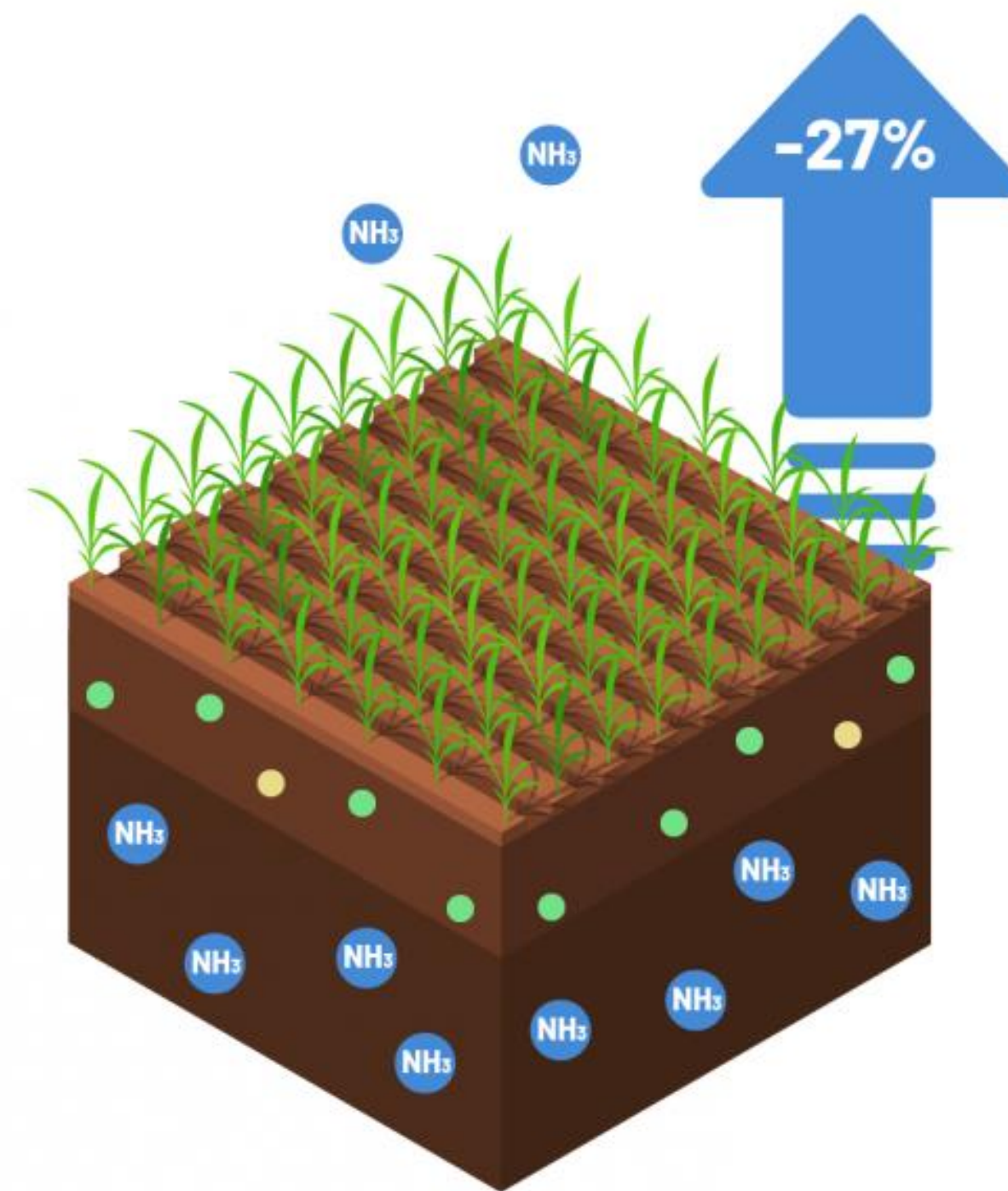
K Forte®, processed with the N Keeper® technology, was evaluated in an **independent research** as an additive to reduce nitrogen losses by ammonia volatilization in nitrogen fertilizers.



**31% K Forte®**



**54,5% K Forte®**



**80% K Forte®**

The research has demonstrated the effectiveness of K Forte® in preventing soil nitrogen from being lost to the atmosphere.





Mitigation of reactions and loss processes

10% to 27% reduction in ammonia volatilization

Increase in agronomic efficiency for the use of urea in agriculture

Optimization of Nitrogen fertilization

With **low environmental impact and low cost for farmers**, N Keeper® represents an important advance of agricultural technologies in the **fight against climate change**.



The Company's **customers and the environment**  
**can already benefit** from the improvements  
enabled by the technology.

For **Plant 2**, the Company will be able to add nitrogen to **BAKS®**, further increasing the benefits for the **N Keeper®** technology.

**FARMERS**

**TESTIMONIALS**

**MR. RESENDE**

**(AGRICULTURAL  
CONSULTANT)**

**K FORTE® AKA**

**SUPER GREENSAND®**





[www.investor.verde.ag](http://www.investor.verde.ag)

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