



Knowledge grows

Making every nutrient count through sustainable crop nutrition management practices



Introduction

Fertilizers are food for plants. Just like humans, plants need a balanced diet of essential nutrients for healthy growth, including nitrogen (N), phosphorus (P), and potassium (K). Adding nutrients lost during harvest back into the soil keeps it fertile so it can produce healthy food. That’s why mineral fertilizers are crucial: they bridge the gap between what the soil provides and what plants need. In fact, the essential nutrients provided by mineral fertilizers contribute to feeding around 50% of the world population by boosting crop yields and ensuring a reliable food supply¹.

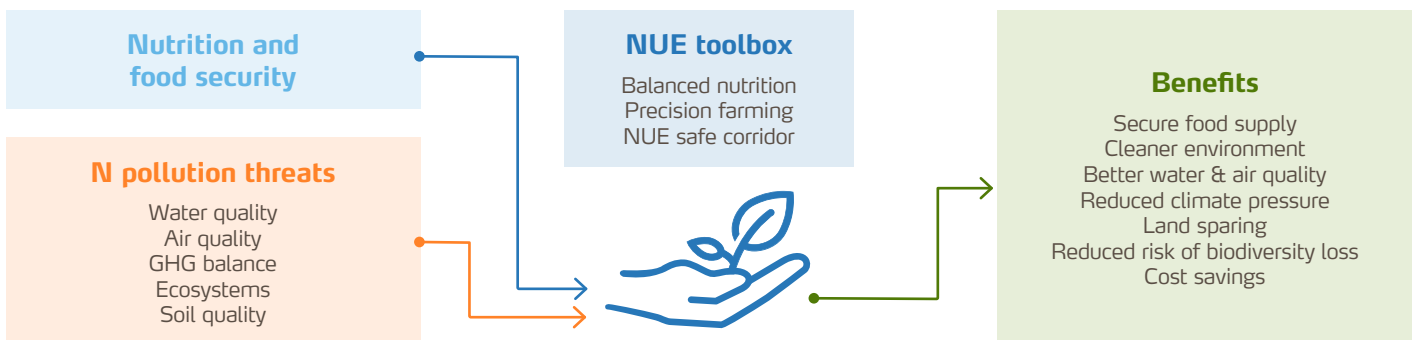
While continuing to provide food for a growing population, we need to reduce nutrient losses into the environment. Farmers need to be supported to make every nutrient count. The most effective nutrient management strategy combines both organic and mineral fertilizers; they are complementary. This synergy is crucial for achieving the European Union’s (EU) ambitious goals: optimizing crop yields, growing healthier crops, enhancing soil health, and safeguarding the livelihoods of European farmers. As many nutrients are still being lost to the air, soil, and water, we need to improve how efficiently we use them. To make this happen, the EU needs to work closely with farmers and everyone in the agri-food value chain.

What is Nitrogen Use Efficiency (NUE) and how is it linked to EU objectives?

Endorsed by the EU Nitrogen Expert Panel³, NUE is a key metric that measures how effectively crops use nitrogen. It’s the ratio between nitrogen inputs into the soil and the amount absorbed by plants. By improving NUE, farmers can ensure their crops can make the most of the applied nitrogen, increasing yields and reducing losses. In other words, enhancing efficiency and reducing nutrient losses are two sides of the same coin.

Focusing on NUE allows farmers to increase productivity while minimizing the environmental impact. Studies show that optimizing NUE not only increases crop yields but also lowers the carbon footprint and enhances water management⁴. This makes it a cornerstone in the shift towards more sustainable and climate-smart food production. Yara is continuously working with farmers to scale up the best nutrient management practices, which are already proven to work. This means applying fertilizers precisely where and when they are needed, ensuring that nutrients reach the crops effectively. To take this to the next level, we must expand soil testing and the use of decision-support tools, powered by precision farming and digital tools, across more farms.

By using best practices and solutions that exist today, European farmers can improve Nitrogen Use Efficiency (NUE) by at least 20%².



¹Uekoetter, Frank & Smil, Vaclav. (2002). Enriching the Earth. Fritz Haber, Carl Bosch, and the Transformation of World Food Production. Environmental History - ENVIRON HIST. 7. 10.2307/3985938.

²Yara’s own research shows that by using best practices and solutions that exist today, European farmers can already improve nutrient use efficiency by at least 20%, increase yields by 5-7% and reduce their carbon footprint related to mineral fertilization up to 20%.

³<https://www.eunep.com/>

⁴Brueck, H., & Lammel, J. (2016). Impact of fertilizer N application on the grey water footprint of winter wheat in a NW-European temperate climate. Water 8, 356. <https://doi.org/10.3390/w8080356>



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The European Commission and Member States should champion the widespread adoption of the NUE indicator⁵ and precision farming digital tools. For example, Yara's Atfarm digital tool allows farmers to increase yields by around 6% while reducing fertilizer application

by around 12%, according to Yara trials. Scaling up existing and other fast-track solutions is essential, along with providing farmers with financial support through the Common Agricultural Policy. More specifically, farmers should be rewarded for:

1. Choosing the right mineral fertilizer and the right nitrogen form

Different fertilizing products have different environmental impacts. By choosing the right mineral fertilizer and the right nitrogen form, farmers can contribute to cleaner air in the EU and reduce nutrient losses to the air.

Replacing all urea-based fertilizers with ammonium nitrate could prevent 63% of overall ammonia emissions from fertilizer application in Europe⁶.

2. Opting for lower-carbon footprint mineral fertilizers

Nitrate-based mineral fertilizers produced in the EU and Norway already have a significantly lower carbon footprint (~50%) compared to most non-EU fertilizers thanks to N₂O catalytic cleaning. By switching to fertilizers produced using low-carbon or renewable ammonia in addition to catalytic cleaning, we can reduce the carbon footprint by ~60-90%.

Switching to lower-carbon footprint fertilizers could reduce the carbon footprint of certain crops by 10% - 30%.

3. Adding precision and knowledge to crop nutrition planning

Plant nutrition is complex and changing weather conditions make it more challenging for farmers to ensure that applied nutrients end up in the harvest and not in the environment. Besides soil testing, precision farming and digital tools, such as Yara's Atfarm, empower farmers to optimize fertilization.

Precision farming and digital solutions can improve the efficiency of fertilizer use by 10%⁷.

⁵M. Quemada, L. Lassaletta, L.S. Jensen, O. Godinot, F. Brentrup, C. Buckley, S. Foray, S.K. Hvid, J. Oenema, K.G. Richards, O. Oenema, Exploring nitrogen indicators of farm performance among farm types across several European case studies, *Agricultural Systems*, Volume 177, 2020, 102689, ISSN 0308-521X, <https://doi.org/10.1016/j.agsy.2019.102689>.

⁶Calculation based on ammonia emission factors for different nitrogen fertilizers applied to normal soils | Hutchins N, Webb J, Aron B (2016): EMEP/EEA air pollutant emission inventory guidebook

⁷Guyomard, H., Bureau J.-C. et al. (2020), Research for AGRI Committee – The Green Deal and the CAP: policy implications to adapt farming practices and to preserve the EU's natural resources. European Parliament, Policy Department for Structural and Cohesion Policies, Brussels.

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