Farming & Air Quality

Rising to the Challenge Together

European farms are essential in providing us quality food, today and in the future. However, the agricultural sector is also responsible for ammonia emissions impacting air quality in Europe. A series of best practices can be applied, both for livestock and crop productions. A workable balance must be found between the viability of farming and the contribution to improvements of air quality in Europe.

Challenge

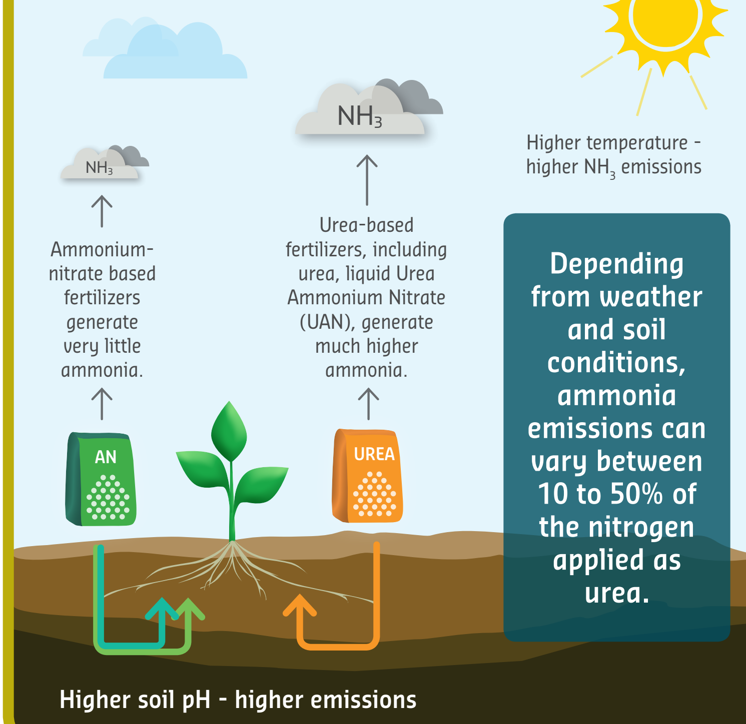
Agriculture is responsible for

92%

of volatile ammonia emissions (NH_3)

64% derived from livestock and manure

Ammonia emissions from fertilizer application depend on the type of fertilizer used as well as weather and soil conditions



Depending from weather and soil conditions, ammonia emissions can vary between 10 to 50% of the nitrogen applied as urea.

* Source: EEA 2018- EU emission inventory report 1990-2016 under the UNECE LRTAP

Good practices

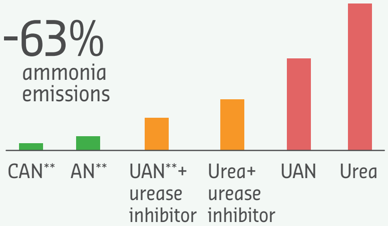
Choice of fertilizer - Optimizing yields by reducing ammonia losses

All farmers want to get better performances from the inputs they buy, and that certainly applies to nitrogen fertilizer. Then it is crucial not to look only at the price of mineral fertilizers, but also at their agronomic and environmental characteristics. Urea might be cheaper as a product, but it leads to higher nutrient losses in the form of ammonia emissions to the air. Volatilized nitrogen is no longer available for plant nutrition, and may consequently result in the reduction of yields, with a resulting detrimental economic impact upon farmers.

The ammonia emissions of Calcium Ammonium Nitrate (CAN) are **63% lower** than that of Urea.

Importance of the form of nitrogen

Factors for ammonia emissions from different fertilizers*



This could help achieving the EU's objective of reducing its total NH_3 emission by 19% by 2030.

** Source: Calculation based on EMEP/EEA air pollutant emission inventory guidebook 2016*

***CAN - Calcium Ammonium Nitrate; AN - Ammonium Nitrate UAN - Urea Ammonium Nitrate*

Optimal use of mineral fertilizers

There are several, well-known good agricultural practices, which European farmers can implement to avoid ammonia losses.

1. **Use Ammonium-nitrate based fertilizers** – these fertilizers ensure the lowest emissions.

2. **If urea:**
   - **> Immediate incorporation** - Incorporation of urea into the soil immediately upon spreading reduces potential volatilization losses by up to 70 %.
   - **> With inhibitors** - For site-specific farm conditions, urea containing inhibitors might remain an option as it reduces ammonia losses in average by -70 to 80%. Urea inhibitors thus can improve nitrogen use efficiency and reduce environmental impacts of this less favourable form of nitrogen.

3. **Consider weather conditions** - humid soils improve diffusion, while cool weather conditions (< 15 ºC) curb the formation of ammonia in the soil and subsequent volatilization losses from urea.

4. **Consider soil conditions** - Alkaline soils (pH > 7.5) result in higher volatilization losses. Ammonium based fertilizer cannot be used on alkaline soils.

5. **Split application** - spreading mineral fertilizers 2 or 3 times instead of 1 time only during the season reduces ammonia concentrations and volatilizations risks.

Precision fertilization for cleaner air

The development of new tools to facilitate the fertilization decision of farmers such as planning instruments, soil analysis, decision-support instruments (testers or apps), variable rate application via GPS or sensors will be beneficial for both the environment and economics of the farm.

Thanks to the growing development and deployment of new technologies ammonia emissions linked to agriculture in Europe are expected to decline by 10% until 2030.

The French case

In 2016, 21,000 French farmers used a decision-support tool on 710,000 ha of wheat. Referring to data from 240 trials conducted in France over 10 years, the use of the hand-held device to measure nitrogen status in crops generated an additional income of €19 million for the French farmers in 2016. But it also reduced nitrogen-based fertilizer's carbon footprint and environmental impact. This figure includes the value created by higher yields, the premium for high protein content in wheat and cost savings from lower fertilizer application. In this case, the additional yield led to an extra production of approximately 85.000 tons of wheat. Customized nitrogen fertilization also contributed to lower greenhouse gas emissions by 71,000 tons of CO_2 in the same period of time.

Source: Yara for Euroactiv

Environmental benefits of curbed ammonia emissions

Good agricultural practices not only help to curb ammonia emissions, but also foster other environmental improvements.

Protecting the natural ecosystems

Precision fertilization as far as the use of mineral fertilizers is concerned, together with strong advisory services provided to farmers, can contribute in ensuring high enough yields on limited surfaces. Consequently, leaving more space for nature and biodiversity and decreasing the eutrophication of water courses.

Enhancing Nitrogen Use Efficiency to curb ammonia

The Nitrogen Use Efficiency (NUE) can be calculated via the ratio between the amount of Nitrogen removed with the crop and the amount of Nitrogen applied. This NUE indicator provides information about the efficiency of Nitrogen applied to an agricultural production system of a country or region. Thus a higher NUE implies a higher N uptake and a lower N surplus (decreasing the risk of losses to air and water). The improved fertilizer and crop management practices and tools made available to farmers by the European fertilizer industry contribute to improve the NUE. For more information visit the EU Nitrogen Expert Panel website (www.eunep.com).

Improving quality of life

Ammonia is an important precursor for secondary fine particles in the air, impacting human health. Ammonia-induced particulate matter contributes up to 58% of particulate matter in cities. Cutting agricultural ammonia emissions improves the air European citizens breath and benefit their health.

Mitigating climate change

Indirect nitrous oxide (N_2O) emissions occur following ammonia deposition. Hence ammonia reduction methods may curb nitrous oxide emissions. By managing nutrients efficiently, especially from organic fertilizers, farmers can better adapt to climate change, sequester more carbon in the soils and reduce the emissions of greenhouse gases such as N_2O emission intensity.

Facilitating clean air compliance with the CAP post-2020

The current revision of CAP post-2020 poses unique opportunity to raise awareness about products and practices to reduce ammonia emissions and tools sustaining precision nutrition. The CAP post-2020 must also promote knowledge-intensive farming (Farm Sustainability Tool for nutrients) and tap into the potential of the increasing amount of data available, in order to enable all types of farmers in Europe to become more competitive and achieve a better environmental performance.

INFINITE FERTILIZERS

Continuing to feed the world

Infinite fertilizers guides the European fertilizer industry's initiatives to ensure that Europe's farmers have access to a variety of safe, high quality, locally produced products, as well as information on their use, environmental impact and nutrient recycling opportunities.

fertilizers europe

Fertilizers Europe represents the majority of fertilizer producers in Europe and is recognised as the dedicated industry source of information on mineral fertilizers. The association communicates with a wide variety of institutions, legislators, stakeholders and members of the public who seek information on fertilizer technology and topics relating to today's agricultural, environmental and economic challenges. The Fertilizers Europe website provides information on subjects of relevance to all those interested in fertilizers contribution to global food security.

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