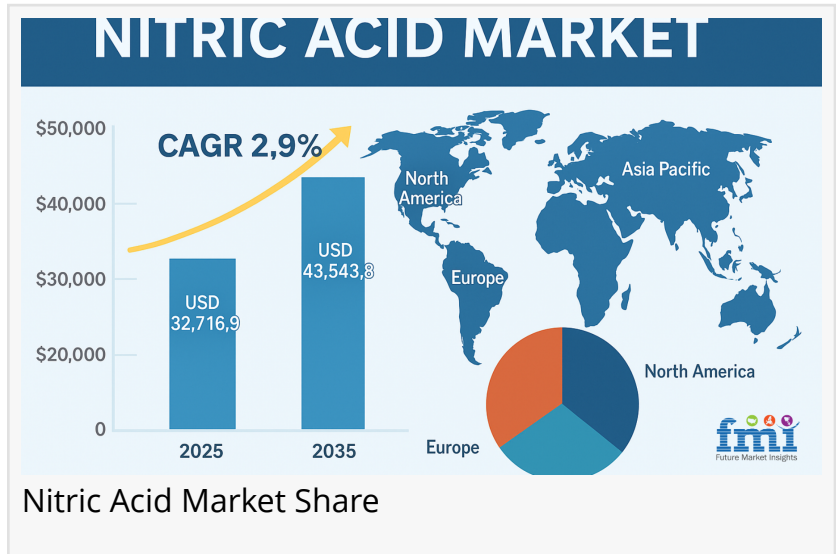


Emerging Role of Nitric Acid in Precision Agriculture and Controlled-Release Fertilizers, Research by FMI

Nitric acid is emerging as a vital input in precision agriculture and smart fertilizers, aiding sustainable crop production globally.

NEWARK, DE, UNITED STATES, May 6, 2025 /EINPresswire.com/ -- The global [nitric acid market](#) is traditionally linked to the production of ammonium nitrate for explosives and fertilizers. However, a quieter transformation is taking place within the sector—its rising significance in precision agriculture and the development of controlled-release fertilizers (CRFs). As environmental policies tighten and farming shifts toward sustainable practices, nitric acid is becoming a strategic component in next-generation crop nutrition solutions. This article explores how nitric acid, beyond its conventional uses, is driving innovation in the agri-tech sector and reshaping sustainable agriculture.



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As sustainability reshapes global farming, nitric acid is quietly becoming essential in high-efficiency fertilizers, offering lower emissions and better nitrogen use efficiency in key regions.”

Nikhil Kaitwade, Associate Vice President at Future Market Insights

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Nitric acid is a colorless, corrosive, and highly reactive mineral acid commonly used across multiple industries. It plays a vital role in the manufacture of fertilizers, particularly through its conversion into ammonium nitrate.

While much of the focus in market reports remains on bulk consumption trends and industrial applications, there is a growing undercurrent of innovation in smaller but impactful areas like micronutrient delivery and climate-

smart farming practices. As governments and private enterprises worldwide push for reduced

greenhouse gas emissions and improved soil efficiency, nitric acid is stepping into an unexpected but critical role in agricultural transformation.

Global Nitric Acid Market – Opportunities and Challenges – Future Market Insights

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What is Precision Agriculture?

Precision agriculture involves site-specific crop management using advanced data analytics, satellite imaging, and sensor technologies to optimize input usage. In this model, fertilizers are no longer applied uniformly but are tailored to the nutrient needs of specific zones within a field. This method reduces waste, increases crop yield, and limits runoff pollution.

Within this framework, nitric acid emerges as a key precursor in the formulation of nitrate-based nitrogen fertilizers. These formulations provide a more immediate and efficient nitrogen source compared to conventional urea-based fertilizers. A 2023 study by the International Fertilizer Association indicated that nitrate fertilizers showed a 15% higher nitrogen use efficiency (NUE) when used in precision application models. Nitric acid, therefore, supports a low-volatility and readily absorbable nitrogen pathway for plants, aligning with the principles of precision agriculture.

Controlled and slow-release fertilizers (CSRFs)

Controlled and slow-release fertilizers (CSRFs) are coated or chemically modified to release nutrients in synchronization with crop requirements. These fertilizers address one of the most pressing issues in agriculture: nutrient loss. In conventional fertilizers, nearly 50-60% of the nitrogen applied is lost to leaching, volatilization, or runoff, contributing to environmental degradation and economic loss for farmers.

Nitric acid, when used to formulate nitrate-based CRFs, enhances stability and minimizes volatilization. One example is calcium ammonium nitrate (CAN), derived in part from nitric acid, which offers a low-risk, slow-release nitrogen source with excellent NUE. Additionally, companies such as Yara International and BASF are actively investing in nitric acid-based CRFs due to their compatibility with polymer coatings and bio-enhanced formulations.

In 2025, the global nitric acid market is projected to reach approximately USD 32,716.9 million, with expectations to grow to around USD 43,543.8 million by 2035, reflecting a Compound Annual Growth Rate (CAGR) of 2.9% during the forecast period. These fertilizers are being adapted for drone-based delivery systems and precision irrigation setups, pushing nitric acid into the core of agri-tech developments.

Nitric Acid Market – Opportunities and Challenges – Future Market Insights

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The Netherlands and Germany have introduced subsidies for CRFs and nitrate-based blends over urea to cut ammonia emissions, placing nitric acid-derived fertilizers in high demand.

In India, the government’s push for “Nano Urea” and integrated nutrient management is indirectly boosting interest in nitric acid-based technologies. Indian fertilizer manufacturers such as Rashtriya Chemicals and Fertilizers (RCF) are exploring nitric acid derivatives for more efficient and cost-effective fertilizer formulations in semi-arid regions. Furthermore, China’s Ministry of Agriculture is piloting precision nitrogen application systems in provinces like Heilongjiang and Hubei, where nitric acid-based fertilizers are tested for paddy and maize crops due to their high solubility and fast action.

These region-specific strategies highlight how nitric acid is increasingly being utilized in contexts that prioritize both productivity and sustainability, even though such uses remain underreported in mainstream nitric acid market analysis.

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The use of nitric acid in agriculture is undergoing a strategic redefinition. Beyond its traditional role in industrial-scale fertilizer production, it is now contributing to solutions that address modern agricultural challenges such as climate resilience, soil degradation, and food security. Market players are shifting focus toward high-efficiency inputs supported by digital farming platforms, and nitric acid is becoming central to these initiatives.

As regulatory bodies around the world establish frameworks that penalize nitrogen losses and reward sustainable practices, nitric acid’s relevance in smart agriculture is poised to grow. The ability to tailor nutrient release profiles, enhance plant absorption, and integrate into IoT-enabled delivery systems is transforming nitric acid from a basic commodity to a functional ingredient in future farming.

The nitric acid market is not just evolving—it is branching into innovative applications that align with the future of agriculture. The compound’s role in precision farming and controlled-release fertilizers is a testament to its adaptability and long-term market potential. As data-driven agriculture continues to gain traction, nitric acid’s versatility in sustainable fertilizer development will likely shift it from a background industrial chemical to a key enabler of global food security and environmental stewardship.

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By Application:

- Fertilizers
- Nitrobenzene
- Adipic acid
- Toluene diisocyanate (TDI)
- Nitrochlorobenzene
- Others

By Region:

- North America
- Latin America
- East Asia
- South Asia & Pacific
- Eastern Europe
- Western Europe
- Middle East & Africa

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Silver Nitrate Market: <https://www.futuremarketinsights.com/reports/silver-nitrate-market>

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