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A deep dive into lowering carbon

Written by
Stef Worsley, *Editor, Fertilizer Focus Magazine,*
Argus Media, UK

Welcome to the March/April edition of Fertilizer Focus! In this issue, Michael Freeman – in his series on the history of modern fertilizers - takes a look at ownership consolidation in the 1980s. Both in Europe and the US, a string of mergers and acquisitions to create multi-national fertilizer groups started in the late 1970s/early 1980s.

The main feature article in this edition is from Fertilizers Europe with their A forecast for food, farming and fertilizer use (2024-2034). Despite a gradual decline in agricultural land, improved fertilization practices and innovation in plant nutrition are expected to sustain crop yields and support food security. The forecast highlights regional difference in fertilizer use in the EU, the role of complementary use of mineral and organic nutrients, and the rebound of mineral fertilizer consumption following recent market disruptions.

Meanwhile, George Marangos-Gilks of agri-tech start up, Messium, discusses new methods of assessing crop nitrogen status with satellites.

He suggests that While laboratory tests offer accuracy, they are expensive, time-consuming and impractical for farmers. Handheld sensors, though more accessible, are not practical at farm level. Existing satellite technologies, which rely on NDVI (Normalised Difference Vegetation Index), can give valuable insights into biomass.

We have a special focus section on "Low carbon fertilizers" in this edition. Firstly, engineers at Heriot-Watt University, put forward the concept that 'transition engineering' is the key to decarbonisation. They suggest the fertilizer industry capitalizes on transition engineering to create a less unsustainable system.

ICL Growing Solutions then looks at how biodegradable CRFs are transforming agriculture. by gradually releasing nutrients in sync with crop uptake, CRFs reduce losses from leaching and volatilization, contributing to healthier soils and improved crop performance. The development of biodegradable coatings for CRFs and the enhancement of sustainability through improved NUE and soil microbiome health represent significant advancements in the field of sustainable agriculture.

Finally, FEECO offers an insight into how to reduce nutrient runoff with wet granulation and coating technologies. Wet granulation and fertilizer coating are pivotal techniques in enhancing nutrient delivery efficiency and mitigating environmental impacts in modern agriculture.

The supplement in this edition is on the industry in Asia. The Centre for Green Technology & Management in India gives an outlook on the future growth of the fertilizer market there.

We also look at "Fertilizer transport routes across Asia" as well as "China's sulphur market".

There is also preview for the Argus Fertilizer Asia 2025 conference which gives readers a taster of the upcoming event on 22 April. This year the agenda features ministerial and industry leader keynote addresses, as well as senior global fertilizer executives discussing the hottest topics in global and APAC fertilizer markets.

Please also take time to peruse the 2025 Media Pack and consider the advertising opportunities in the magazine – we are now reaching over 15,000 readers per edition!

I hope you enjoy the issue. ■

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History of the modern mineral fertilizer industry
Volume 3: 1950-2000 (Part 4)

Ownership consolidation in the 1980s

This is the third and final volume of the history of the modern mineral fertilizer industry by Michael Freeman, which takes a look at the evolution of fertilizers over the past two centuries (Please refer to all editions of Fertilizer Focus in 2022 for volume 1 and editions in 2023/24 for volume 2).

There was a substantial change in the trend of fertilizer demand in the 1980s, when the net increase in nutrient consumption of some 21 mn t was less than 50% of the increase that had taken place during the previous decade. Moreover, the increase in the 1980s was entirely due to the further growth of fertilizer use in Asia and Latin America (+26 mn t), as well as the USSR (+3 mn t), which was more than enough to off-set the downturn in Europe and North America (-8 mn t) – this was before the huge change brought about by the collapse of central planning at the end of the decade.

The significant rise in fertilizer prices in the 1970s led farmers in Europe and North America to re-evaluate their need for nutrients and there appears to have been a particular focus on reducing phosphate and potash levels, that is evident from the consumption data for these regions. Having peaked at the start of the 1980s, fertilizer prices fell back thereafter and stagnated for the rest of the decade.

With the demand for most fertilizers no longer growing in Europe and North America and the trend of international prices being equally disappointing, there was a change of strategy among

Table 1. Changes in Regional Nutrient Consumption between 1980 & 1990 (mn t)

	N	P2O5	K2O	TOTAL
North America	-0.4	-1.2	-1.2	-2.8
West Europe	0.2	-1.4	-0.5	-1.8
Central Europe	-0.8	-1.3	-1.0	-3.1
USSR	0.3	2.2	0.3	2.7
Rest of World	17.0	5.7	3.0	25.7

Data: Calculated by author from IFADAT

Table 2. United States: Ammonia plants classified by capacity in selected years

	1970	1980	2000	2020
Total number of sites	86	81	42	31*
Total capacity (mn s.tons/y)	17.0	20.8	19.6	20.9
of which,				
- less than 100,000 s.tons/y	7%	8%	2%	1%
- 101-300,000 s.tons/y	40%	21%	11%	9%
- more than 300,000 s.tons/y	51%	70%	87%	90%

**includes Donaldsonville LA with 5 plants and Verdigris OK with 2 plants. Source: Calculated from TVA data published by USGS.*

A series of mergers and acquisitions to create multi-national fertilizer groups started in the late 1970s/early 1980s

producers. Many decided to leave the industry or to close down capacities that were no longer seen to be economically viable, especially when competing with big new plants that were integrated into sources of raw material. The process of ownership consolidation and the elimination of uncompetitive production units has been a feature of the mineral fertilizer industry, and indeed of other industries, throughout the 20th century, accelerating in the final decades.

Mergers and acquisitions

In Europe, a series of mergers and acquisitions to create multi-national fertilizer groups started in the late 1970s/early 1980s:

- ***Israel Chemicals Ltd (ICL),*** which had been established in 1968 to take over Israel's phosphate and potash industries made its first forays into Europe in 1976, when it bought Giulini Chemie, a small German fertilizer producer, and then Amsterdam Fertilizers in 1982, followed twenty years later by the purchase of two small potash producers in Spain and the UK.
- ***Groupe Roullier,*** a small French fertilizer producer, bought Hyperphosphate Réno in 1979, which gave it access to ground rock phosphate and mixed fertilizer operations located across Europe, North Africa, Canada and South America.
- ***Norsk Hydro*** began its long-term programme of buying fertilizer companies in 1979, starting in Europe with the purchase of the Dutch nitrogen producer NSM, followed in the 1980s with acquisitions in Sweden, UK, Germany France and Italy. These and other fertilizer assets were organised into the Hydro Agri division, which was eventually spun off from Norsk Hydro in 2004, by which time it had become one of the world's biggest fertilizer producers.
- ***Kemira,*** the Finnish chemical and fertilizer producer, attempted to follow a similar path to the Norwegian company, buying unwanted fertilizer assets in Europe, starting in 1982 with a small UK producer and moving on to acquire others in Denmark, Belgium, Netherlands and the UK to become Europe's second largest fertilizer company. This business was rebranded as Kemira Growhow and was spun off from its parent company in 2004 and subsequently acquired by Yara in 2007.

North America development

In North America a series of large acquisitions took place between 1976-78 when the newly-formed Potash Corp. of Saskatchewan (PotashCorp) acquired five of the province's new potash mines to become a major player in this industry. Two decades later, in the late 1990s, PotashCorp decided to build a position in phosphates and nitrogen by acquiring big producers in the United States. Another portentous development in this period was the purchase by Koch Industries of the Gulf Central ammonia pipeline in 1988, followed in the 1990s by the purchase of IMCC's Sterlington LA ammonia plant and by an investment in the latest ammonia plant in Trinidad. Koch went on to acquire more nitrogen operations in the following decades and became the second largest nitrogen producer in North America.

There were pressures on the ammonia industry in the 1980s

Phosphoric acid capacity in Europe that now supported most of the region's output of phosphate and complex fertilizers faced both economic and environmental challenges in the 1980s. In contrast to this, the big phosphate rock miners in Florida and North Africa were able to add to their integrated capacities for concentrated phosphate products that they sold to European bulk blenders of NPKs – the European blending sector having expanded strongly in the hands of fertilizer distributors, who were now no longer dependent on the region's established producers of NPK compounds for products to sell. Most of the phosphoric acid plants that had been built in Europe were located at ports where they could receive imported raw materials, i.e. phosphate rock and sulphur or pyrites, but these sites were becoming increasingly unsuitable for the disposal of the phosphogypsum that is generated at the rate of 4-5t per t of P_2O_5 as acid. The move to shut down small phosphoric acid plants began in the 1970s and accelerated in the 1980s, when more than 1 mn t/y P_2O_5 acid capacity was closed in Europe (West and Central), followed in the 1990s by closures totalling 2mn t/y P_2O_5. By the end of the century the phosphoric acid capacity had been eliminated form most countries in Europe. Over the same period, the two big North African phosphate producers (Morocco and Tunisia) expanded their total acid capacity from 2 mn t/y P_2O_5 to 5 mn t/y P_2O_5, mainly to service their export markets with concentrated phosphates.

Ammonia capacities

There were similar pressures on the ammonia industry, chiefly economic ones determined by differences in the price and availability of feedstock, with the pressure coming from new producers. These producers had access to natural gas allowed their nitrogen products to become increasingly competitive and start to make an impact in world markets. This led to closures in Europe of many small and medium-sized ammonia plants. In the 1980s these aggregated some 4 mn t/y at 30 sites and in the 1990s by another 4 mn t/y at 15 sites.

There was a similar trend in North America, where deliveries of ammonia from the USSR under the Oxy deal started to make an impact in 1978. In the following two decades, the total amount of ammonia capacity in the United States remained close to 20 mn s.tons/y, but the number of production sites was halved because many small and medium-sized plants were closed and replaced by large capacity units of more than 300,000 s.tons/y which eventually dominated the industry. ■

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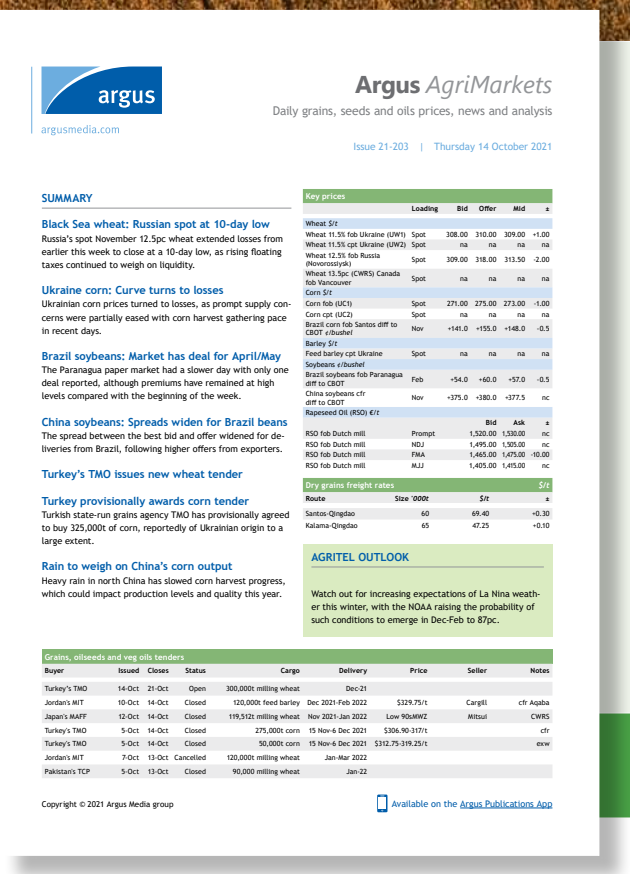

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Daily grains, seeds and oils prices, news and analysis

Issue 21-203 | Thursday 14 October 2021

SUMMARY

Black Sea wheat: Russian spot at 10-day low
Russia's spot November 12.5pc wheat extended losses from earlier this week to close at a 10-day low, as rising floating taxes continued to weigh on liquidity.

Ukraine corn: Curve turns to losses
Ukrainian corn prices turned to losses, as prompt supply concerns were partially eased with corn harvest gathering pace in recent days.

Brazil soybeans: Market has deal for April/May
The Paranagua paper market had a slower day with only one deal reported, although premiums have remained at high levels compared with the beginning of the week.

China soybeans: Spreads widen for Brazil beans
The spread between the best bid and offer widened for deliveries from Brazil, following higher offers from exporters.

Turkey's TMO issues new wheat tender

Turkey provisionally awards corn tender
Turkish state-run grains agency TMO has provisionally agreed to buy 325,000t of corn, reportedly of Ukrainian origin to a large extent.

Rain to weigh on China's corn output
Heavy rain in north China has slowed corn harvest progress, which could impact production levels and quality this year.

Key prices

	Loading	Bid	Offer	Mid	±
Wheat $/t					
Wheat 11.5% fob Ukraine (UW1)	Spot	308.00	310.00	309.00	+1.00
Wheat 11.5% cpt Ukraine (UW2)	Spot	na	na	na	na
Wheat 12.5% fob Russia (Novorossiysk)	Spot	309.00	318.00	313.50	-2.00
Wheat 13.5pc (CWRS) Canada fob Vancouver	Spot	na	na	na	na
Corn $/t					
Corn fob (UC1)	Spot	271.00	275.00	273.00	-1.00
Corn cpt (UC2)	Spot	na	na	na	na
Brazil corn fob Santos diff to CBOT ¢/bushel	Nov	+141.0	+155.0	+148.0	-0.5
Barley $/t					
Feed barley cpt Ukraine	Spot	na	na	na	na
Soybeans ¢/bushel					
Brazil soybeans fob Paranagua diff to CBOT	Feb	+54.0	+60.0	+57.0	-0.5
China soybeans cfr diff to CBOT	Nov	+375.0	+380.0	+377.5	nc
Rapeseed Oil (RSO) €/t					
			Bid	Ask	±
RSO fob Dutch mill	Prompt		1,520.00	1,530.00	nc
RSO fob Dutch mill	NDJ		1,495.00	1,505.00	nc
RSO fob Dutch mill	FMA		1,465.00	1,475.00	-10.00
RSO fob Dutch mill	MJJ		1,405.00	1,415.00	nc

Dry grains freight rates $/t

Route	Size '000t	$/t	±
Santos-Qingdao	60	69.40	+0.30
Kalama-Qingdao	65	47.25	+0.10

AGRITEL OUTLOOK

Watch out for increasing expectations of La Nina weather this winter, with the NOAA raising the probability of such conditions to emerge in Dec-Feb to 87pc.

Grains, oilseeds and veg oils tenders

Buyer	Issued	Closes	Status	Cargo	Delivery	Price	Seller	Notes
Turkey's TMO	14-Oct	21-Oct	Open	300,000t milling wheat	Dec-21			
Jordan's MIT	10-Oct	14-Oct	Closed	120,000t feed barley	Dec 2021-Feb 2022	$329.75/t	Cargill	cfr Aqaba
Japan's MAFF	12-Oct	14-Oct	Closed	119,512t milling wheat	Nov 2021-Jan 2022	Low 90s/MWZ	Mitsui	CWRS
Turkey's TMO	5-Oct	14-Oct	Closed	275,000t corn	15 Nov-6 Dec 2021	$306.90-317/t		cfr
Turkey's TMO	5-Oct	14-Oct	Closed	50,000t corn	15 Nov-6 Dec 2021	$312.75-319.25/t		exw
Jordan's MIT	7-Oct	13-Oct	Cancelled	120,000t milling wheat	Jan-Mar 2022			
Pakistan's TCP	5-Oct	13-Oct	Closed	90,000 milling wheat	Jan-22			

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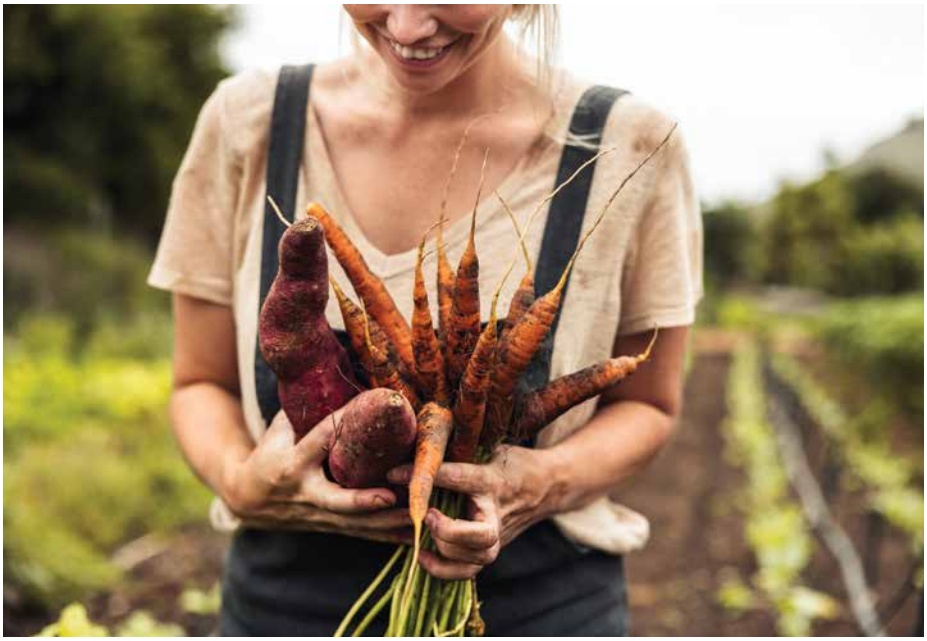
A forecast for food, farming and fertilizer use (2024-2034)

Mineral fertilizers: Supporting food security and sustainable agriculture

Written by

Chris Poole, *Agriculture and Environment Officer,* ***Fertilizers Europe, Belgium***

How is European agriculture evolving in the next decade? Fertilizers Europe's "Forecast for Food, Farming, and Fertilizer Use (2024-2034)" provides a comprehensive look at expected shifts in cropping patterns, fertilizer consumption, and land use across the EU. Widely recognized by policymakers and international organizations, this annual forecast combines official data with expert analysis to offer insights into the factors shaping food production in Europe.



Advancements in fertilization practices and innovative products have enabled farmers to boost production per hectare

Despite a gradual decline in agricultural land, improved fertilization practices and innovation in plant nutrition are expected to sustain crop yields and support food security. The forecast highlights regional difference in fertilizer use in the EU, the role of complementary use of mineral and organic nutrients, and the rebound of mineral fertilizer consumption following recent market disruptions.

The evolution of European agricultural land use

Over the past half century, the agricultural area in the European Union has steadily declined; however, advancements in fertilization practices and innovative products have enabled farmers to boost production per hectare, ensuring sufficient food output for the growing population.

In 2024 total agricultural area in EU-27 (including UK and NO) included 122.9 mn hectares of fertilized farmland, with an additional 38.9 mn hectares left unfertilized. 70.7% of the fertilized land is used for arable crops such as

In the past half century, the agricultural area in the EU has steadily declined

cereals, oilseeds, and fodder crops. Permanent crops like vineyards, orchards, and forests make up 9.4% of the fertilized area, while fertilized grassland constitutes 20.1%.

Regional disparities persist in agricultural land use. In EU-14 countries, for example, 61.9% of fertilized land is allocated to arable crops. In contrast, we see a stronger reliance on cereal and oilseed production within EU-13 countries, where arable crops comprise 88.2% of the fertilized area.

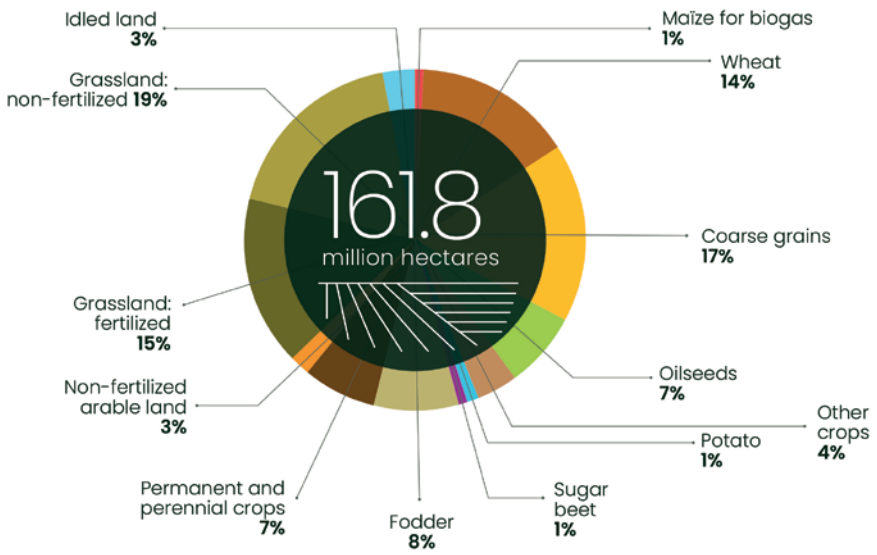
Land sparing potential of efficient plant nutrition

Despite a slight decline in the overall agricultural area, yield improvements will continue to support healthy levels of production. Balanced plant nutrition including mineral fertilizers boosts crop yields and soil fertility on existing farmland, reducing the need for agricultural expansion and helping to preserve more natural ecosystems - a key strategy in land sparing efforts.

Wheat yields are forecasted to rise by 2.6%, even as cultivated land declines by 0.3%. Similar developments are expected for other cereals. While less land is expected to be allocated to grain maize (-2.1%), productivity improvements (+8.3% yield increase) will ensure stable production levels Environmental and agronomic challenges continue to influence potato, sugar beet and oilseed rape cultivation, resulting in slightly declining productivity per hectare compared to grain crops.

Following a significant drop in fertilizer as a result of the 2022 energy crisis, mineral fertilizer consumption is now rebounding

Figure 1. Agricultural land use in the European Union



Expectations for the future of mineral fertilizer use

Following a significant drop in fertilizer as a result of the 2022 energy crisis, mineral fertilizer consumption is now rebounding. It is however not expected to return to pre-war levels.

By the 2028/29 season, fertilizer consumption is projected to increase:

- Nitrogen from 8.7 to 9.4 mn t
- Phosphate from 2.0 to 2.4 mn t
- Potash from 2.2 to 2.6 mn t

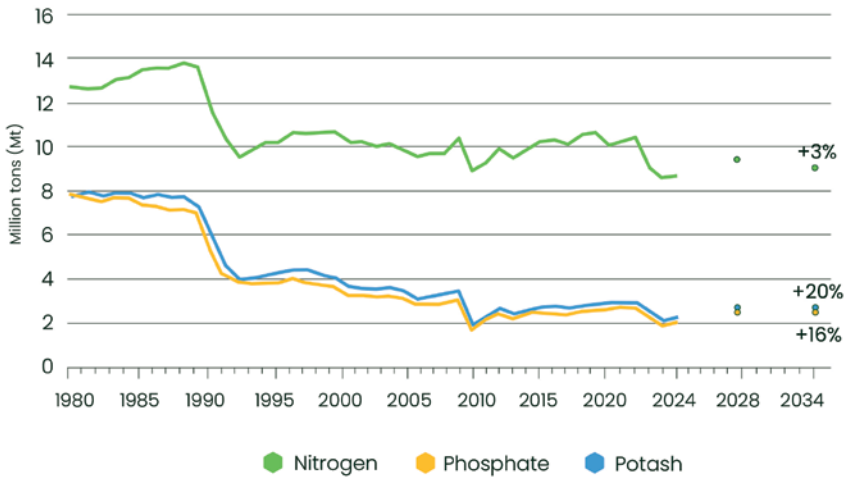
Looking ahead to 2034, nitrogen (N) consumption is predicted to stabilize at 9.0 mn t, while phosphate and potash levels will remain slightly below pre-2008 economic crisis levels, reaching 2.4 and 2.6 mn t, respectively.

The decade ahead presents both opportunities and challenges

Most European countries anticipate rising fertilizer use, the exceptions being Ireland, the Netherlands, and Croatia. The significant increase in phosphate and potash is a result of the exceptional drop in consumption of phosphorus (P) and potassium (K) fertilizers in 2023, also known as a P & K holiday. P & K fertilizer levels are slowly returning to normal while farmers replenish what has been removed from the soils. An overall upwards trend is thus expected for phosphate and potash consumption across Europe.

Mineral fertilizers provide precise, immediate, and consistent nutrient supply, ensuring optimal plant growth and high productivity

Figure 2. European mineral fertilizer utilization and forecast



Organic nutrient availability

The plant nutrition picture is not complete without the inclusion of both mineral and organic nutrient sources. Currently, Fertilizers Europe's organic database used in the Forecast represents only the largest source of organic nutrients derived from animal manure. Though other organic inputs exist—such as compost, cover crops, and bio-based fertilizers—the report primarily tracks manure-derived nutrients due to its widespread use and established data sources.

Organic nutrient application remains stable, supplementing mineral fertilizers. In 2023, 8.3 mn t of nitrogen from livestock manure was applied, nearly matching mineral nitrogen fertilizer use. Additionally, 4.5 mn t of organic phosphate were applied alongside 2.0 mn t from mineral sources, while 9.9 mn t of potash from organic sources complemented 2.2 mn t of mineral potash.

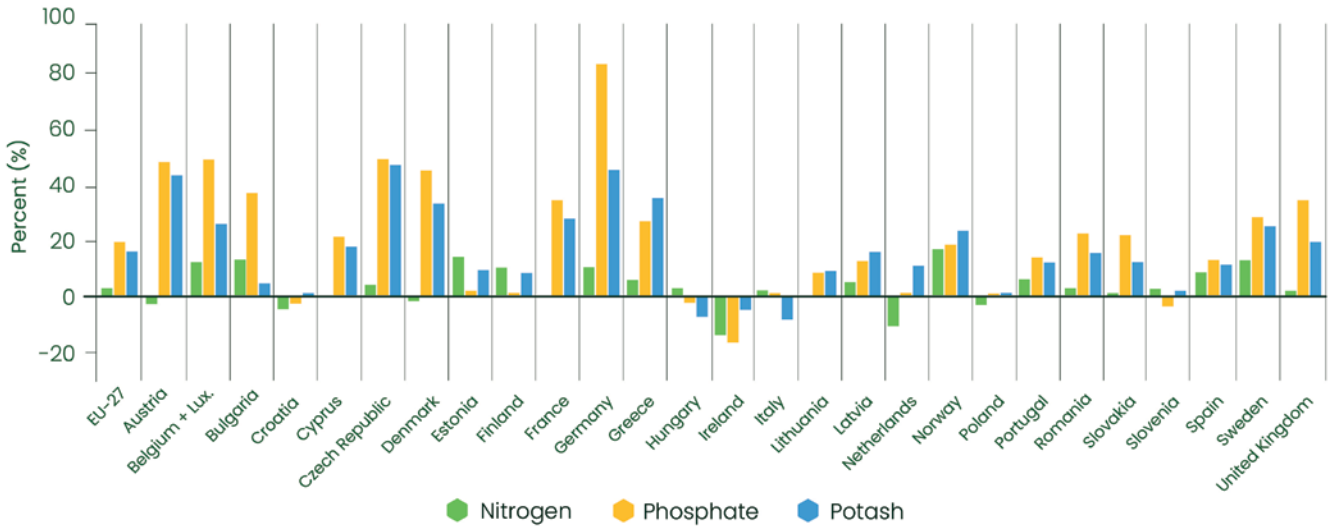
However, regional differences are apparent. Western Europe utilizes the highest amount of organic nutrients, whereas Central and Eastern Europe have significantly lower volumes due to the difference in overall livestock density. Despite these contributions, organic sources alone are not sufficient to meet plant nutrient demands due to variability in nutrient content, availability, and application constraints. Mineral fertilizers provide precise, immediate, and consistent nutrient supply, ensuring optimal plant growth and high productivity.

How the forecast is made

Fertilizers Europe's forecast is an annual exercise that uses the following procedure:

- At the end of each growing season, a general European scenario is established based on quantitative information (from the FAO-OECD, USDA, FAPRI, and the European Commission) and a qualitative analysis made by Fertilizers Europe experts.

Figure 3. Changes in regional fertilizer use 2024-2034



Organic nutrient application remains stable, supplementing mineral fertilizers

- The general scenario is then adapted to the specificities of each country and national forecasts are made.
- The national forecasts are analyzed and discussed by all the experts.
- When the market and economic situation require it, the forecasters carry out a final update of the current situation before integration and publication.

The forecast is an upward crop-based procedure where fertilizer consumption is evaluated by assessing the evolution of the cropping area and the nutrient application rates for each crop. However, two different methodologies are used to achieve this crop-based procedure:

- In most European Union countries, representing the majority of its agricultural area and fertilizer consumption, the forecast is an expert-based approach constructed from national forecasts generated by Fertilizer Europe's members.
- In Croatia, Cyprus, and Slovakia, evaluation of the crop area and production as well as N, P and K application rates on each crop are based on a combination of data taken out of the IFA, FAO, and European Commission databases. When precise figures are not available, the evaluation is based on an agronomic model developed by the group of forecasters, for both the current value and the 10-year forecasted value.
- Malta is currently not covered in the forecast.

An industry at the crossroads of energy, agriculture, and food security

The Fertilizers Europe Forecast exercise highlights the vital role of mineral fertilizers in generating yields, and sustaining soil fertility.

Despite challenges such as climate change and shifting regulations, advancements in plant nutrition and balanced fertilization strategies continue to drive productivity gains while supporting environmental conservation.

The decade ahead presents both opportunities and challenges for European agriculture. While policies evolve and production methods adapt, the EU fertilizer sector is already taking decisive steps toward decarbonization, nutrient efficiency, and circular solutions. Collaboration, policy coherence, financial support, and the market adoption of innovative, low-carbon products will be key to scaling these efforts across the agri-food chain.

For the full Fertilizers Europe report please see: *https://www.fertilizerseurope.com/wp-content/uploads/2024/12/Forecast-2024-34-web.pdf* ■

Transformative scalable solutions for global soil health

Inside the pioneering partnership between IAEA and Anglo American

Written by

Dr Kathryn Bartlett, *Soil Science Principal,* ***Anglo American, UK***

As climate change intensifies, bringing with it erratic weather patterns, soil degradation, and water scarcity, the world faces unprecedented challenges in ensuring a stable and sustainable food supply.

Soil salinity, exacerbated by climate change and unsustainable farming practices, is a silent but devastating issue that affects more than 930 mn hectares of agricultural land globally. With each passing day, approximately 2,000 hectares of farmland are rendered unproductive due to salt accumulation, leading to an estimated USD27 bn in economic losses annually. Salinization of soil is usually a result of poor land management and use of brackish irrigation waters but can be a naturally occurring phenomenon also. The impact is particularly severe in arid and semi-arid regions such as the middle east, Latin America and China, where many smallholder farmers rely on marginal land to feed their communities and sustain local economies.

In response to these pressures, the International Atomic Energy Agency (IAEA) and Anglo American have joined forces on a transformative five-year project. Leveraging Anglo American's expertise in sustainable crop nutrient solutions and the IAEA's nuclear science capabilities, this ambitious partnership seeks to address the crisis of soil salinity—a growing threat to agriculture and global food security.

(left) Agriculture must transition to practices that increase food production and minimise environmental harm

Food security

Launched under the umbrella of the IAEA's and Food and Agriculture Organization's (FAO) Atoms4Food initiative, the project highlights the role of nuclear techniques in modern agriculture and is a flagship example of how advanced science can drive innovative sustainable agricultural practices and solutions. The collaboration aligns with Atoms4Food's mission to accelerate the development and deployment of nuclear techniques to improve crop resilience, soil health, and food security globally.

Tom McCulley, CEO of Anglo American's Crop Nutrients business, said: "Our research partnership with the IAEA is a perfect example of our purpose in action – we are re-imagining mining to improve people's lives. It is abundantly clear that, as a society, we need to change the way we grow food around the world – moving away from legacy inputs into more sustainable farming practices. Polyhalite has a major role to play and we are currently developing a mine in the UK to access the world's largest known deposit. Soil degradation and salinisation is an enormous and underappreciated problem, and I congratulate the FAO and the IAEA for their leadership on this critical issue and we look forward to making a real difference through our collaboration."

Rafael Mariano Grossi, Director General of IAEA, said: "To tackle global hunger and increase food security, we need science, we need innovation, and we need to make the most of all available tools, including nuclear techniques. We also need everybody engaged, especially the private sector. This partnership with Anglo American will help us to maximise impact and scale up interventions."

About polyhalite

Polyhalite is a naturally occurring mineral formed 260 mn years ago when ancient sea waters evaporated, leaving behind nutrient-rich deposits. The ancient sea now exists as a large mass of rock over a mile underground off the coast of the UK, stretching across the North Sea into northern Germany and Poland.

Whilst polyhalite can be found elsewhere in the world, the Woodsmith Project is currently being developed to access the largest and highest grade known resource in the world. Located within the North York Moors National Park, Woodsmith will be unlike any other mine in the world, setting the standard for a cutting edge and low environmental impact underground mine as it is being constructed in a way to blend into its surrounding landscape and to keep the surface footprint to an absolute minimum. The mined ore will be transported in a 37 km underground tunnel from the mineral face to the port reducing overland traffic, emissions and visual impact.

Polyhalite naturally contains the essential nutrients to help crops thrive —potassium, sulphur, magnesium and calcium, making it a perfect choice for sustainable agriculture. Through a simple process of crushing and granulating, polyhalite is transformed into POLY4, a multi-nutrient granulated fertiliser with low carbon intensity, designed for both conventional and organic farming.

Balanced nutrition

As global farming practices advance, recognition of the importance of balanced nutrition is growing. Adding POLY4 to a fertiliser regime can help provide a more balanced and nutritious diet to the plant, resulting in more nutritious food via stronger, healthier and more productive crops. More than 2000 commercial farm demonstrations have been conducted on more than 80 crop types in more than 40 countries with a median yield increase of 3-5%.

Isotopic techniques will be used to trace nutrient interactions in saline soils

Polyhalite's natural structure includes a low chloride content and calcium and magnesium which are proven to improve soil structure by helping to displace salts whilst bolstering soil forming factors.

This generally leads to an improvement in structure by flocculating clay particles together improving water ingress and infiltration and therefore speeding up the removal of excess sodium cations from the soil.

Dr Kathryn Bartlett, soil science principal at Anglo American's Crop Nutrients business said, "We need to move away from legacy 20th Century thinking, focused on delivering only the major nutrient needs to boost yields, to a more holistic view which understands that we are interacting with a complex natural ecosystem that we may not fully understand. Every input we apply and practice we instigate must be considered in the context of the crop, soil and environmental impacts we are having. It is only by applying this framework that we will drive the changes required in agriculture to meet productivity, biodiversity and emissions goals that are emerging from the UN's Sustainable Development framework."

(left) Analysing the importance of soil health; *(right)* Tom McCulley, CEO of Anglo American's Crop Nutrients business and Rafael Mariano Grossi, Director General of IAEA sign the pioneering research agreement

An innovative partnership

The IAEA and Anglo American coordinated research project is designed to harness the unique benefits of both nuclear science and sustainable mineral resources.

The IAEA will use isotopic techniques to trace nutrient interactions in saline soils. This method allows scientists to monitor nutrient absorption and movement within the soil structure, providing a clearer picture of how crop nutrition can enhance soil fertility, reduce sodium content, and promote healthier crop growth in challenging conditions.

The project also forms part of the IAEA and FAO's larger Atoms4Food initiative, launched to expand the use of nuclear techniques in improving food production, soil health, and resilience to climate change. The Atoms4Food programme seeks to equip member countries with the technical tools and knowledge necessary to address agricultural challenges through nuclear science. It emphasises research on nutrient management, crop productivity, pest control, and water conservation—all essential to ensuring food security in a changing climate.

Soil salinity, exacerbated by climate change, is a silent but devastating issue

Accessible information

As part of its broader goals, it will also address the importance of climate-smart agricultural practices. Saline soils are especially vulnerable to extreme weather conditions, and by restoring soil structure and nutrient levels, the project seeks to improve water retention and boost crop resilience. These methods not only strengthen local food systems but also contribute to broader environmental goals, such as reducing agriculture's overall carbon footprint.

The IAEA and Anglo American are equipping communities with the knowledge and tools needed to implement sustainable practices.

The Atoms4Food initiative has established a framework for this knowledge transfer, ensuring that farmers understand how to use polyhalite and other soil amendments, adopt improved irrigation techniques, and monitor soil health effectively. Through these efforts, local communities will gain practical skills and a deeper understanding of sustainable agriculture, allowing them to take an active role in restoring and maintaining soil productivity. As the project progresses, its scalability and potential to reach other regions offers a promising vision for the future of sustainable agriculture. Initially focusing on a select group of pilot countries, the project aims to create guidelines and best practices that can be shared globally, setting a new standard for addressing soil degradation and salinity.

By the end of the five-year period, the IAEA and Anglo American plan to publish findings through peer-reviewed journals, international conferences, and community workshops. The Atoms4Food platform will be central to disseminating these insights, making the research accessible to other countries and empowering them to adopt climate-smart agricultural practices. ■

A new age for nitrogen management?

Hyperspectral imaging has the potential to transform nitrogen management in agriculture, says George Marangos-Gilks of agri-tech start up Messium

Traditional methods of assessing crop nitrogen status, such as laboratory tests, handheld sensors and tractor sensors, have limitations in terms of scalability, cost, and timeliness.

While laboratory tests offer accuracy, they are expensive, time-consuming and impractical for farmers. Handheld sensors, though more accessible, are not practical at farm level. Existing satellite technologies, which rely on NDVI (Normalised Difference Vegetation Index), can give valuable insights into biomass, but fall short in directly quantifying nitrogen levels within crops.

George Marangos-Gilks, CEO, Messium

Enter hyperspectral satellites. These take imaging beyond red, green and blue light to include the invisible infrared spectrum. First launched by NASA around 10 years ago the early examples of these satellites were hugely expensive and downloading data from them was very time consuming. But in 2024 the first commercial constellations were launched creating the possibility of cheaper and more powerful satellites. Indeed, the number of hyperspectral satellites is increasing at a rapid rate and agri-tech start-up Messium now has access to 15.

Understanding biomass

"There is a new age coming with much richer data," says George Marangos-Gilks, Messium CEO. "Hyperspectral's application for assessing nitrogen in crops is based around the fact that every chemical on earth absorbs and reflects a wavelength and has a spectral signature and research has shown that there are key nitrogen wavelengths. We can take these wavelengths and use that to develop a very good understanding of the amount and intensity of the nitrogen in the crop."

"Hyperspectral satellites are the first satellites ever to be able to see nitrogen," he stresses.

Previous generation satellites such as NDVI are adept at understanding biomass – different levels of green density in the crop and where the biomass is larger or smaller – but they cannot tell if that biomass has high or low nitrogen.

There is a new age coming with much richer data

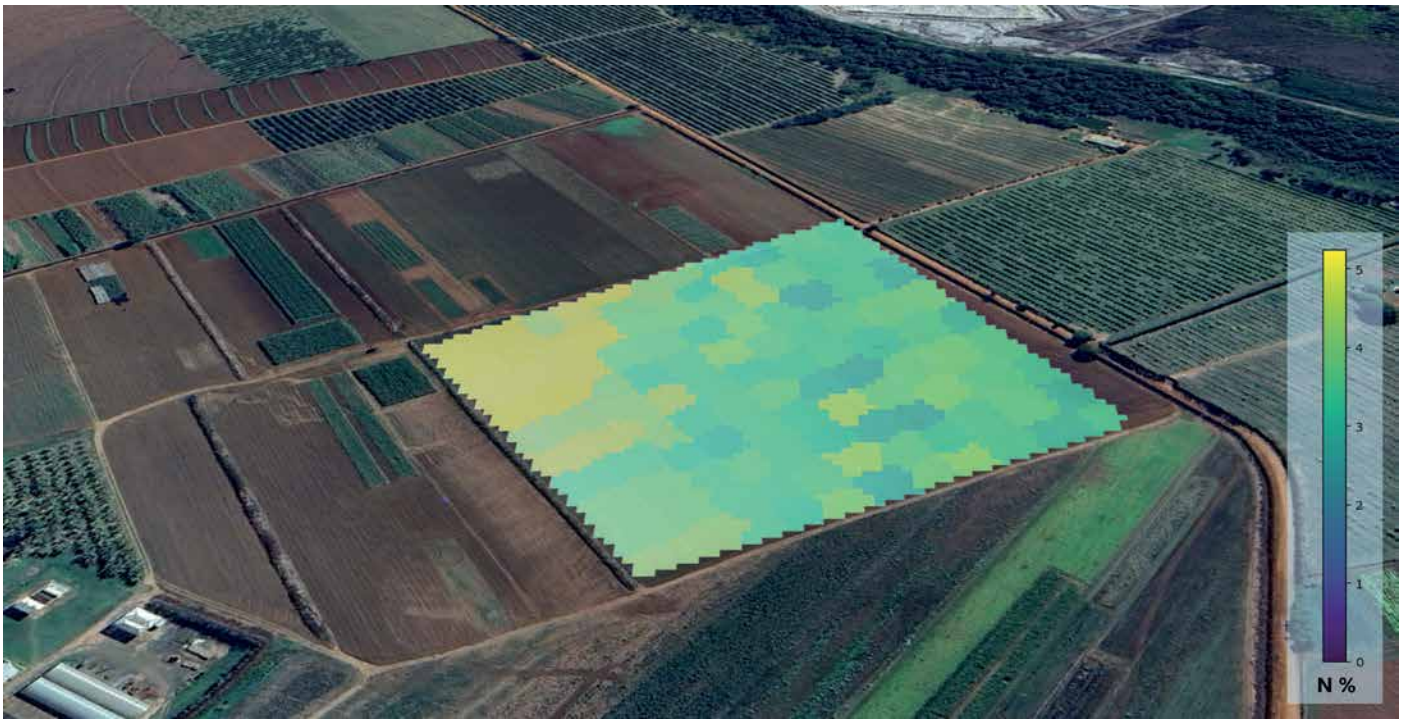
"This is the big revolution. We are linking biomass and nitrogen insights together to then apply the science."

Messium has collected 14,000 samples to date – each sample being a 50cm row of crop which is connected to a GPS location and sent to a laboratory who analyse it for nitrogen concentration and biomass.

George continues: "We take this data and match it to the satellite images that were acquired at the same time. The more we link this data together the more powerful our predictive AI model becomes. We think hyperspectral can be 90% as accurate as a laboratory test. The model is currently 84% accurate and we believe it will reach 90% by 2026."

Nitrogen nutrition index

Handheld sensors and tractor are also accurate, but they are time consuming and impractical. Tractor sensors in particular only assess the crop as it is driven over.



Monitoring crop nitrogen from space – Conchal, Brazil (August 2024)

"You could be two weeks too early or too late to hit that optimum nitrogen level.

"The obvious solution therefore is satellites. With satellites you can image an entire farm, but NVDI simply doesn't do nitrogen. You could have high biomass and low nitrogen in the crop of high biomass and high nitrogen. It doesn't tell you whether you're above or below that nitrogen nutrition index, the critical nitrogen curve which is the key to utilising the science effectively."

Unlike NDVI cloud cover is not an issue for hyperspectral satellites. "There are only two NDVI satellites that come over about every 10 days so it's very easy to have cloudy images."

In contrast there are 15 hyperspectral satellites that Messium will be working with next year. "There is basically a satellite overhead every single day, so the chance of having a cloud-free day in a two-week period in the UK is about 96%. With the number of satellites set to double in 2026, cloud is simply not an issue."

Tom Jewers, Wood Hall farm, Suffolk, UK

Critical nitrogen curve

In 2024 Messium collected over 1,000 samples from 47 farms across Europe.

"The results showed that 51% of fields were over-fertilized, they were 40% above the critical nitrogen curve. Then 39% of fields were under-fertilized, by an average of 28%. That's a big error either side. But it makes sense – it is very difficult to understand the nitrogen concentration of a crop mid-season."

Messium also worked with 14 trial farmers in the UK and 10 of those saw a financial benefit in terms of cost saving from reducing nitrogen

Traditional methods of assessing crop nitrogen status have limitations

(left to right) Vishal Soomaney Vijaykumar, Messium CTO and co-founder, Nick Wilson, Farmer and Violet Hill, Lead Crop Growth Modeller, Messium

application or yield gained from increased application.

Three were helped with reduced nitrogen for the second or third application, says George. “For four farmers, who were actively trying to reduce nitrogen use, we could demonstrate how applying a bit more would boost yields. Then for three farmers, we noticed that nitrogen was not the limiting factor. Plenty of nitrogen had been applied, the crop was not responding, and it wasn't increasing in biomass. This indicates, potentially a P, K, manganese or calcium issue instead.”

On-farm trials

Tom Jewers farms 900 acres of arable crops in mid-Suffolk. He has been trying to reduce nitrogen applications to increase efficiency and has a keen interest in technology that could potentially help.

Satellite imagery had previously been a source of ‘endless frustration’ he says. “We started using NDVI imagery in about 2011, but realised that if we couldn't get even establishment, it was pointless.

“We then used a variable seed rate to try and get a level playing field, and then varied the nitrogen. When we were purely looking at biomass the advice was always to chuck more on the low bits, and invariably they don't catch up, so you then put less on afterwards.

“It seemed to me that was the wrong advice. We're now measuring the nitrogen in the crop. Here in the east of England we can suffer with very dry springs, so we've tended to start applying more and more N earlier.

“If we're above the critical N curve, then it's not going to take that nitrogen up as efficiently, because it's already got too much, so our use efficiency will go down.

“The really interesting thing to me from working with Messium is the delay in application.”

Tom had eight trial strips – some managed under his usual regime, others with higher rates of nitrogen and another in accordance with Messium’s findings. The Messium strip received 227kg of nitrogen and the strip next to it received 225kg, however the Messium strip yielded 0.6t/ha more. This was due to the timing of that application.

“Seeing that yield response from a place in the field where there isn't historic variation was really interesting,” concludes Tom. “We don't often see that sort of response from a trial so I'm quite excited by this.” ■

News in brief

EUROPE

EU looks to organics to cut import dependency

The EU is advocating the use of low-carbon fertilizers and recycled nutrients as part of its environmental strategy to cut reliance on synthetic fertilizers, particularly those imported from outside the EU as it tries to bolster food security in the region.

In a formal communication from the European Commission to the European Parliament, Council, European Economic and Social Committee and Committee of the Regions, the EU cites "an increasing concentration of imports from a few origins, particularly for urea, with about 88% of EU imports supplied by four countries."

Cutting such dependencies is a "win-win" as it would support domestic fertilizer production within the EU; farmers can count on a reliable supply and stable prices; and the environment and climate would benefit through the uptake of low-carbon fertilizers and recycled nutrients, such as Recovered Nitrogen from Manures (RENURE) and digestate after appropriate treatment and their efficient use.

The document says special attention needs to be paid to improving nutrients management at the farm level and increasing nutrients circularity. Priority should be given to addressing nutrient pollution hotspots and promoting integrated territorial approaches. A key aspect of this would be the management and control of nutrients from livestock farming to limit negative externalities, support extensification in regions with high livestock concentrations, and promote circularity that can help reduce the use of synthetic fertilizers.

The document adds that plant breeding innovations, including the use of biotechnological tools such as new genomic techniques (NGTs), are key to accelerating the development of climate-change resilient, resource-saving, nutritious and high-yielding varieties, and thereby contribute to the EU's food security and food sovereignty. NGTs can also yield micro-organisms with positive impact on agricultural production, for example by reducing the need for synthetic fertilizers.

The European fertilizer market is considered mature and is typically the highest priced in the world. This is partly because of logistics — its geographical location and ports mean that considerable fertilizer, particularly nitrogen and phosphates, comes from north Africa and Russia in comparatively small vessels, pushing up freight costs. As such, supply options are limited. It is also a high-cost fertilizer producer and vulnerable to external shocks in terms of feedstock cost spikes, particularly natural gas, which can push some producers off line and raise finished fertilizer import dependency.

Farm groups oppose fertilizer tariffs on Russia

EU agriculture could suffer "extensive economic harm" from additional tariffs on fertilizer imports from Russia and Belarus, EU agriculture industry associations Copa and Cogeca said. The European Commission in January proposed new tariffs on a fixed EUR/t basis — in addition to existing 6.5% import duties — for all nitrogen-based products, as well as DAP, MAP, NPK, NP and NK. The proposal, which requires approval from the European Parliament and a qualified majority of EU member states, would see rates increase annually until reaching a maximum of EUR430/t from 1 July 2028.

Copa-Cogeca argued that the measures would leave European farmers "up against a wall without viable or alternative solutions". The trade group, which enjoys political support in the parliament and among member states, urged the commission to "immediately" eliminate import duties on fertilizers from third countries other than Russia and Belarus. And Copa-Cogeca demanded a one-year postponement of the Russia-Belarus tariffs, to 1 July 2026, to allow markets to adapt. The industry group also suggested limiting tariffs to nitrogen fertilizers only.

Farmers are also pushing for the new tariffs not to be "cumulative", on top of existing anti-dumping duties on Russian urea ammonium nitrate and ammonium nitrate. Copa-Cogeca additionally proposed raising import quotas to pre-war levels, enhancing price monitoring and establishing automatic safeguard measures that would be triggered when fertilizer prices exceed reference thresholds.

The group also wants the commission to promote manure use by granting derogations to the EU nitrates directive's limits for processed manures and pastures. But an industry source pointed to "broad understanding" across the political spectrum, with the commission's proposal likely to be able to secure a sufficient majority to enter into force by this summer. Postponing the tariffs by one year, as sought by Copa-Cogeca, would make the proposed measures "meaningless", the source said.

And EU agriculture and food commissioner Christophe Hansen said at a meeting of EU agriculture ministers this week that the "tariffs are foreseen to kick in over a three-year period, so this will be something gradual and not have the full impact from the very first moment". Hansen noted that the EU depends heavily on imports from third countries. "We need to boost domestic production, not only gas or energy-based fertilizers," he said, pointing to organic fertilizers.

Industry body Fertilizers Europe has called for the EU to increase proposed tariffs on Belarusian and Russian fertilizers to 30%, albeit with a gradual implementation of import duties every six months.

Romgaz eyes Romanian fertilizer producer Azomures

Romanian state-controlled gas producer Romgaz is considering acquiring domestic fertilizer producer Azomures, prime minister Marcel Ciolacu suggested.

"Romgaz wants to take over the largest chemical fertilizer producer in the country. I fully support the project, it is the best solution for our farmers," Ciolacu said at the government session, without giving details.

Ciolacu did not name the target, but is likely to have been referring to Azomures, owned by Switzerland-based trading firm Ameropa. Azomures can typically produce up to 1.6mn t/yr of fertilizers — including urea, AN, CAN, UAN and NP/NPKs — and is also one of Romania's largest industrial gas consumers, with demand of about 1bn m^3/yr at capacity.

"Romgaz is actively evaluating potential synergies in line with its strategy. However, at this time, we do not have any official information to share regarding a potential acquisition of Azomures," Romgaz told Argus.

Azomures production has been suspended since August 2024. High gas prices and increased fertilizer market volatility have forced it to suspend or reduce output several times in recent years.

Romanian private-sector chemicals firm Chimcomplex said in October that it was in preliminary talks about buying Azomures, but no deal materialised.

Romania aims to increase gas output to 18bn-20bn m^3/yr by 2027 from the present 8bn-10bn m^3/yr by developing the Black Sea's Neptun Deep field, in which Romgaz and Austria's OMV Petrom each hold 50%. Neptun Deep holds over 100bn m^3 of gas.

NORTH AMERICA

Tariffs would cut US phosphate imports from Mexico

US fertilizer supply would tighten if a proposed 25% tariff on Mexican imports is not cancelled following upcoming trade negotiations.

President Donald Trump was expected to impose the tariff on 4 February against Mexican and Canadian goods, but under a new agreement Mexico's tariff will be postponed for a month.

Mexico was the third largest supplier of US MAP during the 2023/24 fertilizer year, with nearly 136,000 t, and has been in the top five origins for US MAP imports for at least the last ten years, according to US Census Bureau data. Mexico has played an increasing role as a supplier to the US over the last decade, especially after the US enacted countervailing duties against Russian and Moroccan phosphate in 2021.

Two barge trades occurred before the Mexican tariffs were delayed. A Nola MAP barge traded at USD590/st fob for full February delivery, compared with a February delivery barge trade from last week at USD580/st fob. A loaded MAP barge also traded at USD585/st fob Nola.

But following the announcement of the US-Mexico agreement, sources expect phosphate trade to slow, driven directly by Mexican supply concerns, and market attention should turn once again toward the domestic potash market where the lion's share of US supply is Canadian tons.

MIDDLE EAST

MOPCO to enhance sustainable urea and ammonia production with thyssenkrupp Uhde's carbon capture and green ammonia solutions

thyssenkrupp Uhde has been selected by MOPCO – Misr Fertilizers Production Company (Egypt) – to supply advanced technology for three existing ammonia and urea plants in Damietta, Egypt, to enhance the sustainability of their production. Using an innovative carbon capture and usage (CCU) solution from thyssenkrupp Uhde, the aim is to remove up to 145,000 t/year of CO_2 from the flue gas of the existing ammonia production and use them in the urea production. At the same time, three state-of-the-art uhde ammonia converter cartridges will be installed in the existing converters to increase ammonia production capacity while lowering natural gas consumption in the synthesis loop by around 10%. To bring down CO_2 emissions even further, additional green hydrogen feedstock will be sourced from new water electrolysis units powered by renewable energy. MOPCO plans to produce up to 150,000 t per year of green ammonia.

Ahmed Mahmoud El-Sayed, Chairman of the Board and Managing Director of MOPCO: "This collaboration with thyssenkrupp Uhde marks a significant step towards our sustainability strategic goals. Their world-leading technologies will not only increase our production capacity but also deliver proof for our commitment to provide more climate-friendly urea and produce green ammonia, where MOPCO will become one of the leaders to produce such products in MENA."

Nadja Håkansson, CEO of thyssenkrupp Uhde: "We are proud to enable our longstanding partner MOPCO to expand their business towards a greener production through our innovative carbon capture and low-emission ammonia solutions."

The ammonia and urea plants (three plants each) were originally built by thyssenkrupp Uhde between 2006 and 2015, each plant having a capacity of approximately 1,200 metric tons per day (mtpd) of ammonia and 2,000 mtpd of urea respectively. Now, to increase ammonia production capacity, three new uhde ammonia converter cartridges will be inserted. The new cartridges, based on the latest design principles like removable beds with axial-radial

flow design, will boost production by 150 mtpd per plant in order to allow MOPCO to produce ammonia. This is achieved through a significant increase of effective catalyst volumes and utilizing Johnson Matthey's high-performance catalyst KATALCOTM 74-1 as part of the solution.

As the cartridges are designed for installation in existing pressure shells, hardware adjustments are kept at a minimum and the revamp can be carried out with minimized downtimes. thyssenkrupp Uhde will provide comprehensive services throughout the installation and start-up phases, including the tie-in of the planned green hydrogen supply.

ASIA

Chinese association calls for stable potash prices

The China Inorganic Salts Industry Association (Cisia) issued an initiative urging potash producers and suppliers to prioritise supply and price stability in the domestic market.

The initiative comes following a recent surge in domestic demand and potash prices, driven by strong demand from NPK producers for the spring application season, concentrated procurement activity, and bullish price expectations. This has led to concerns about price volatility.

Domestic MOP prices have increased by around CNY400/t (USD55/t) recently. Ex-warehouse prices for port-side 62% MOP were at CNY2,950-3,000/t on 20 February, up from CNY2,570-2,630/t a month earlier and CNY2,450/t a year earlier.

The association outlined a few key actions for potash producers, importers, and distributors in the initiative. Potash producers are urged to optimise production, improve efficiency, and speed up the resumption of operations for plants that are currently under maintenance to ensure sufficient supply during the spring application season.

Importers are encouraged to diversify import channels, increase market supply, and actively release national reserves to stabilise the market. The initiative also calls for distributors to maintain reasonable price ranges, avoid sharp price increases unrelated to cost fluctuations, and prioritise supply to downstream NPK producers and farmers.

China is taking steps to ensure stable supply and prices of fertilizers, as the spring application season is approaching. Government officials issued a notice in February, calling on suppliers and distributors to ensure sufficient fertilizer supply for the season. For phosphates, multiple producers announced domestic price cuts of CNY200/t for DAP in January, aiming to reduce the cost burden for farmers.

SOUTH AMERICA

Hy24 to invest in Atome's Paraguay green fertilizer plant

ATOME has announced the signing of non-binding Heads of Terms with Hy24's managed Clean H2 Infra Fund for an up to USD115 mn investment in the Villeta project in Paraguay. Under the proposal, the Clean H2 Infra Fund will become the anchor and lead equity investor in relation to the Company's flagship 260,000 t/year green fertilizer project. The agreement marks a significant milestone towards Final Investment Decision.

Olivier Mussat, CEO of ATOME, commented: "We welcome Hy24, a worldwide leader in hydrogen private equity finance, as an anchor equity investor and are excited to bring the project to full financial close in the first half of this year. The Hy24 team has demonstrated deep industry expertise that will accelerate our project development. This demonstrates the substantial value in ATOME's business model of developing shovel-ready projects that combine market offtake and strong financial returns with significant development impact, backed by our proven management expertise."

Pierre-Etienne Franc, CEO and Co-Founder of Hy24, commented: "This marks Hy24's first step toward a potential direct investment in the region through our Clean H2 Infra Fund. We are committed to supporting the most promising project developers who contribute to providing cleaner alternatives. ATOME's Villeta project stands as one of South America's most advanced green fertilizer initiatives, driven by Paraguay's exceptional renewable resources, a highly experienced team that has effectively advanced the project's development, and strong offtake potential within the Mercosur region. Villeta has the capacity to significantly enhance the region's food sovereignty."

Peru backs Saudi critical minerals hub plan

Peru's foreign minister Elmer Schialer said he supports US policy backing Saudi Arabia's efforts to become a global critical minerals powerhouse, a strategy that aims to counterbalance China's dominance and bring down costs.

Speaking at the Munich Security Conference, Schialer called the US approach "a good strategy". Schialer was responding to a question on whether the US' backing of Saudi Arabia's efforts to become a critical minerals refining and processing hub was a good idea.

"I think we ought to give it a try, because when we have two, three or four main centres of refinement and the finalizing the product, the cost will also eventually go down, which is also very important, economically speaking," Schialer said.

Led by the US, western countries are keen to loosen China's stranglehold on access to critical minerals. China controls about 90% of the world's capacity for processing the minerals and has steadily tightened restrictions on exporting the materials and technology needed to process them.

Beijing imposed new restrictions on exports to the US in late January in response to President Donald Trump's tariffs on imports to the US from China.

Saudi Arabia in recent years has made strides in positioning itself on the global critical minerals map. As part of its economic diversification plan Vision 2030, the kingdom aims to strengthen local processing and industrial value added, while building supply chains that are more resilient to global disruptions. Saudi Arabia also has reiterated its commitment to developing its substantial reserves of copper, gold, rare earths, potash, and bauxite, while also expanding domestic electric vehicle manufacturing.

Riyadh in January unveiled plans to develop a new mineral investment project valued at USD100bn, USD20bn of which was already in the final engineering phase or under construction.

The kingdom's Ministry of Industry and Mineral Resources increased its estimate of the value of its unexploited mineral resources from USD1.3 trillion to USD2.5 trillion in early 2024, boosted by new discoveries.

State-controlled Aramco has also created a joint venture with Saudi state mining company Ma'aden to explore and produce energy transition minerals.

AFRICA

AXA Climate contributes to the launch of the first climate insurance product designed to protect farmers in the Democratic Republic of Congo (DRC)

This initiative is part of the National Agricultural Development Program (PNDA), implemented by the DRC's Ministry of Agriculture and supported by the World Bank and the Global Shield Financing Facility, which aims to modernise agriculture and improve farmers' living conditions in three pilot provinces: Kasaï, Kasaï-Central and Kwilu.

The DRC is facing increasingly severe climatic challenges. Since 1951, average national rainfall has steadily decreased, declining by up to 40.79 mm/month per century. As a result, more than 21.8 mn people face food insecurity due to droughts and other natural disasters.

Against this backdrop, the PNDA has introduced a significant innovation: starting in 2025, a climate insurance product will be launched to protect up to 300,000 farmers in the three pilot provinces from drought (early and mid-season) and excessive rainfall (late season).

In the event of a severe climatic shock, the climate insurance will protect farmers benefiting from the NADP through direct and rapid payments, with amounts that could, in the most extreme situations, reach up to USD100 of coverage per farm annually, representing around 15% to 20% of a farmer's average annual income. This compensation will enable farmers to purchase seeds and resume farming activities for the following season or year. Compensation will be paid directly to farmers without intermediaries or commissions.

This solution was developed in collaboration with experts from the DRC Ministry of Agriculture, the Autorité de Régulation et de Contrôle des Assurances (ARCA), the World Bank, AXA Climate, the World Food Programme and national insurance companies. During a series of working sessions, stakeholders jointly designed the main technical and operational parameters of the insurance product. This parametric insurance product, underwritten by the DRC Ministry of Agriculture and financed by the World Bank with the support of the Global Shield Financing Facility, relies on indices derived from satellite rainfall data (TAMSAT and ERA5). When satellite data indicates that pre-defined rainfall thresholds have been exceeded, the compensation process is automatically triggered within hours.

The product will be distributed by Mayfair Insurance Congo SA, the leading member of a national consortium comprising other insurers operating in the DRC (ACTIVA, RAWSUR, GPA, Société Financière d'Assurance, SONAS, and SUNU). Reinsurance will be provided by ZEP-Re.

Jean de Dieu Mbey Bosimi, national coordinator of the PNDA within the Ministry of Agriculture, hopes that this insurance will reinforce the modernization of agriculture in the country: “This insurance will offer Congolese farmers essential protection against climatic risks, encouraging them to invest in ways that improve both their productivity and income.”

Alain KANINDA NGALULA, Managing Director of ARCA, comments: “The launch of agricultural insurance marks a major leap forward for the insurance sector in the DRC. It illustrates the key role of the regulator in fostering innovation and expanding financial services to benefit the population. which aligns with the vision of the Head of State, HEM Felix Antoine TSHISEKEDI TSHILOMBO, regarding agricultural governance underpinned in particular by the establishment of the National Farmers' Register and the operationalization of an agricultural insurance system. Food self-sufficiency must no longer be a mere slogan but become a reality”.

Gaudens Kanamugire, Managing Director of Mayfair Insurance Congo SA, says: “We are dedicated to protecting farmers' livelihoods and creating a local culture of agricultural insurance.”

Pierre Toyum, ZEP-Re Director for the DRC, adds, “Our commitment as a reinsurer demonstrates our confidence in the transformative potential of insurance for Africa’s agricultural sector.”

Cristina Stefan, Project Manager at the World Bank, adds: “We will closely monitor the results of the insurance and refine the product over time. This large-scale initiative could pave the way for the introduction of agricultural micro-insurance in the DRC.”

On the technical front, AXA Climate led the mission. Karina Whalley, Director of the Public Sector Department, is delighted with this inspiring step forward for the sector: “We are honoured to bring AXA Climate's expertise to Congolese farmers. This achievement would not have been possible without the steadfast commitment of the DRC Ministry of Agriculture, the World Bank, national insurers and the Autorité de Régulation et de Contrôle des Assurances”.

This step illustrates the commitment of the DRC and its partners to building a more resilient agricultural sector capable of addressing climate challenges.

AUSTRALASIA

Australia's CSBP to halt Kwinana superphosphate output

Australian manufacturer CSBP has shut down its 90,000-100,000 t/yr superphosphate (SSP) manufacturing plant in Kwinana, and will switch to an import model going forward. The company said the plant is going into "care and maintenance", and the facility will be repurposed to increase CSBP's storage capacity. CSBP is the fertilizer division of WesCEF, a subsidiary of Western Australia (WA)-based conglomerate Wesfarmers subsidiary.

CSBP said the decision was made because of a "long-term decline in market demand for SSP as growers continue to reduce livestock numbers, combined with increasing competition from overseas suppliers and rising operational and raw material costs, including sulphuric acid."

Sulphuric acid has become increasingly expensive because of production curtailments in the WA nickel industry, which meant it needs to be imported. A market participant estimated the closure of the SSP plant will result in sulphuric acid imports falling by 50,000-60,000 t/yr.

"Choosing the care and maintenance option gave the business the flexibility to recommence operations in the future, if market conditions change," said CSBP Fertilisers' general manager Ryan Lamp. But market participants think a reopening of the plant is highly unlikely, considering much cheaper SSP imports are available, principally from China.

CSBP's fertilizer sales rose by 31% to 396,000t in the first half of the July 2024-June 2025 financial year compared with a year earlier, according to the company's half-year presentation.

Australian chemicals and fertilizer producer Incitec Pivot also recently announced it would cease manufacturing SSP at its 350,000-400,000 t/yr plant at Geelong by the end of this year. This will leave Ameropa's 150,000-200,000t/yr facility in Hobart, Tasmania as the last operational SSP plant across the Oceania region. Market participants think the closure of CSBP's and IPL's plants will spell trouble for Ameropa's plant, which likely makes SSP swaps with IPL from time to time. ■

MARKET ANALYSIS ›

Commodity updates • Shipping news • Price watch

Soft commodities: Wheat supply-demand balance stable on last year

Information from ***Argus Agritel Outlook***

Wheat summary

Russia's wheat exports continued to lag in January, with export duties squeezing margins. Increases in cpt prices at Black Sea ports outstripped gains in fob Novorossiysk wheat prices in recent weeks. A stronger rouble in late January-early February also weighed on the origin's export competitiveness. Added to the grains export quota in place from mid-February, we have cut our expectations for Russia 2024-25 wheat exports to 42.55mn t from 44.5mn t previously.

Southern hemisphere origins should be able to secure wheat market shares in the coming months amid lower exports from the Black Sea and the EU. EU and Black Sea export availability was at a 10-year low with only 30mn t technically available for export from the two regions combined at the end of January. This will only be partially offset by export availability from the US, Argentina and Australia combined amounting to 52.8mn t at the end of January, up by 11.2mn t compared with the same time last year. As a result, any shift in global import demand for the rest of the current campaign will be instrumental in shaping future price movements.

In 2025-26, Argus expects the top eight exporting regions to produce a combined 392.3mn t of wheat, up by 13.9mn t from 2024-25 and above the five-year average. The EU should see the largest increase in production to 133.2mn t, up by 13mn t from the historically low 2024 harvest, boosted by higher areas and yields.

We still expect Russia to harvest a similar amount of wheat compared to 2024. The weather remains mild in the European part of the country, allowing the crop's vegetation development to progress. But low soil moisture levels and the risk of late frost events could reduce the yield potential, and we will survey winter crop conditions at the end of March during our Black Sea region crop tour, during which we will revise our forecasts for Russia, Ukraine and Romania.

A cold spell in the US has not yet led us to revise our wheat production estimates for the country, as it is too early to assess its potential impact on the crop. We still forecast 51mn t to be produced in 2025-26, down from 53.7mn t in 2024-25. Overall supply, which includes beginning stocks, should remain stable compared with the previous season. But an expected increase in feed demand and possible tariffs on the country's wheat imports following US president Donald Trump's recent announcements may strain the US wheat supply to demand balance situation in 2025-26.

In the main importing regions, 2025-26 will start with beginning stocks at just 25mn t against 29mn t in 2024-25. Production is likely to decrease in Pakistan, Syria and Iraq after a bumper crop in 2024-25. And wheat output in the Maghreb, Middle East and South Asia is due to shrink by 1mn t from last year. Combined with a slight increase in consumption, the regions' import needs are expected to rise by 5mn t to 54mn t.

As a result, ending stocks in the top eight exporting regions are expected to recover only slightly to 60mn t. The wheat supply-demand balance looks comparable to 2024-25 for now but the weather risks in the main wheat-producing regions are higher than last year so far.

Feed grains summary

The US corn market has been a key driver for the global market. The country's export sales continued at a strong pace, allowing the country to gain market shares. Exports from the top four corn exporting regions from March to June could be tight amid low supply in Ukraine, strong US exports so far and a lower production outlook in Argentina. And any volumes lost in Brazil and Argentina will redirect demand to the US origin, for both 2024-25 and 2025-26 volumes.

Figure 1. Wheat price (USD/t)

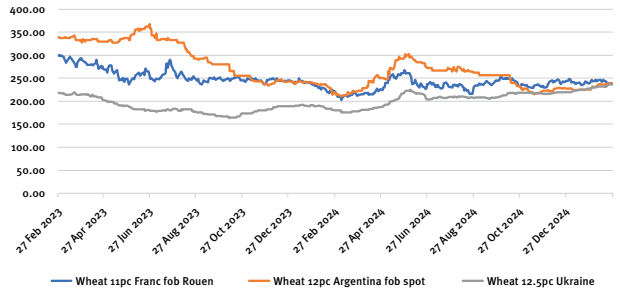


Figure 2. Corn price (USD/t)

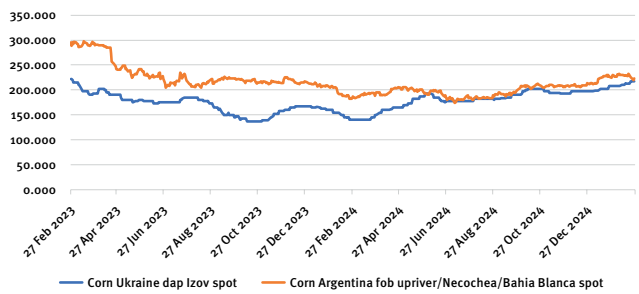
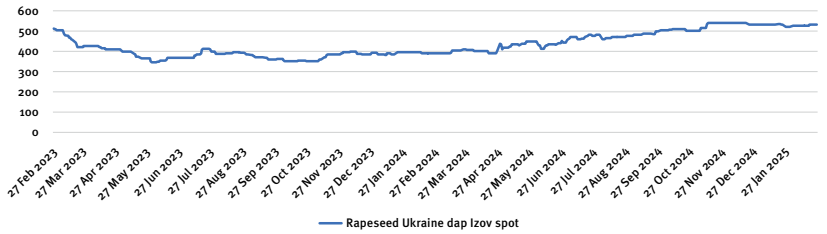


Figure 3. Rapeseed price (USD/t)



The resumption of rainfall has offered some relief to Argentina's crops, but the rains were not sufficient to drastically improve production prospects. We still expect 2024-25 production at 48mn t in our base-case scenario, with a worst-case scenario below 40mn t. That said, we note that our worst-case scenario is not the most likely at present. Further out in the 2024-25 season, Brazil's safrinha crop should be an essential driver for global corn prices. Above-average rainfall in Brazil, which has so far slowed the pace of the soybean harvest, risks delaying the planting of the country's second corn crop. We estimate that over 10mn t of production could be in question should planting delays materialize.

Looking out to 2025-26, US corn output could reach a record high of 395mn t, compared with 378mn t in 2024-25, and boosted by a soy-corn price ratio supportive for corn plantings. This will more than offset lower beginning stocks at 36mn t compared with 45mn t in the current season. Ending stocks in 2025-26 are unlikely to reach a record high, amid strong exports and feed demand. This outlook is likely to pressure new crop corn prices during the crop's planting and development in spring-summer 2025.

That said, the regulatory uncertainty prevailing at present also needs to be weighed up. We have yet to get clarity on the scale of trade tensions between the US on the one hand, and Canada and Mexico on the other. The Trump administration has made clear its intention to hit goods imported from both countries with a 25% tariff. But Mexico may choose to keep corn out of any potential retaliatory tariffs, given its dependency on corn imports and the current drought affecting its domestic crop. Mexico's corn production in 2025-26 could fall to a 14-year low of 21.5mn t, from 23.7mn t in 2024-25. We also expect Mexico to produce less wheat, which will increase its reliance on corn imports, which we forecast 4mn t higher than the 2024-25 season at 29mn t.

After China restricted corn and feed grains imports by capping feed processors' output and suspending corn auctions for a number of months, we further cut the country's corn imports for the marketing year to 7.2mn t down from 9mn t previously. Wheat and barley imports are revised down by 1mn t each to 7mn t and 8mn t, respectively. But we note that the country may still renew its grain imports in the first quarter of 2025.

In the rest of the feed complex, renewed global demand for feed barley benefits the French origin. After a sluggish start to the marketing year, French exports are gaining momentum, consequently reducing the country's ending stock projection for 2024-25.

Oilseeds summary

Prospects for Canadian canola oil exports to the US remain in question, given the uncertainty surrounding possible tariffs between the two countries, and doubts over whether US biofuels policies will support increased blending of canola oil-based fuels. The prospect of sweeping tariffs on Canadian flows to the US was delayed by a month, after President Donald Trump issued an order that would have imposed a 25% tariff on all non-energy imports from Canada on 1 February. Tariffs would also impact Canada's canola meal exports. But the tariffs are not the only threat faced by the Canadian canola oil industry, given doubts persisting on whether US biofuels policies will incentivize additional blending of canola oil-based fuels. These two factors could reduce the appetite for domestic canola crushing in Canada, which had been growing steadily in recent years, and incentivize canola seed exports to the rest of the world instead.

Regulatory uncertainties also weigh on the soybeans outlook. China has for now excluded US agricultural crops from retaliatory tariffs, after the US also announced tariffs on flows of Chinese products into the US. Any escalation in the tensions on agricultural products trade between the US and China could cast doubts over the level of demand for US soybeans harvested in 2025. But for now, a significant disruption to the trade flow appears to have been averted. In terms of supply, the corn-soy price ratio in the US is more supportive of corn planting than at the same time last year. As a result, we produce a first forecast for US soybean planted acreages at 84mn acres, compared with 87.1mn acres planted in 2024. That said, with a yield in line with the 2024 yield—at 53.2 bushels/acre—production of 120mn t could still be achieved.

Closer in, some uncertainties also remain on the level of supply expected in the coming months from South America. Brazil's harvest started late in Mato Grosso—Brazil's largest soybean-producing state—as wet weather hampered field work. In the short term, this risks restricting the amount of soybeans crushed domestically, as supplies from the previous harvest dwindle and beginning stocks are low. As a result, we estimate crushing for Brazil and Argentina combined to have slowed to below 6.5mn t in January, down from a monthly crush above 8mn t in recent months.

In Argentina, crop conditions declined sharply in recent weeks despite rainfall resuming, maintaining a risk on the level of supply available in the remainder of 2024-25. Running a model that predicts yields based on crop conditions, a yield at 2.33 t/ha would be a worst-case scenario. It is worth noting that should crop conditions improve before the harvest starts in March, the modelled yield would automatically increase. For now, we maintain our base-case yield forecast at 2.8 t/ha in our balance sheets, down from 2.9 t/ha previously. Under our current base-case scenario, production would stand at 48.7mn t, which is still 2mn t below our previous forecast, leaving room for 41mn t of crushing. In our worst-case scenario, crushing in Argentina could be as low as 37mn t. ■

Shipping and trade news

Yara Clean Ammonia and NYK conclude world's first time-charter agreement for ammonia-fuelled medium gas carrier

Yara Clean Ammonia, the world's largest ammonia distributor, signed a time-charter contract with Nippon Yusen Kabushiki Kaisha (NYK) for an ammonia-fuelled medium gas carrier (AFMGC) to be delivered in November 2026.

"Our successful collaboration with NYK enables us not only to comply with future regulations related to CO_2 emissions from sea-going vessels but also helps us to ensure that our customers can receive carbon-intensity compliant clean ammonia throughout our supply chain from well to wake," says Murali Srinivasan, Senior Vice President Commercial in Yara Clean Ammonia.

Since 2021, Yara Clean Ammonia and NYK have jointly studied the practical application of an ammonia-fuelled ammonia gas carrier, and the companies have now concluded the world's first time-charter contract for an AFMGC, the most popular type of vessel for the international maritime transportation of ammonia.

"I am pleased to have concluded this charterparty which will give us great flexibility to manage carbon emissions and product carbon intensity. I look forward to a successful cooperation in operating this new technology to its best efficiency," says Csaba Laszlo, Vice President Ammonia Trade & Shipping in Yara Clean Ammonia.

The use of an AFMGC will greatly contribute to significantly reducing GHG emissions from marine transportation and developing an ammonia supply chain by providing a more environment-friendly means of ammonia transport as demand grows for ammonia use in the power sector, for marine fuel, and the like.

"In November 2023, we released the 'NYK Group Decarbonization Story' declaring a target of achieving net-zero GHG emissions by 2050. We have been developing an ammonia-fuelled vessel because we believe that using alternative fuels, especially ammonia, is essential to reaching the net-zero goal. We are delighted to have concluded this time-charter contract with Yara Clean Ammonia, the world's largest ammonia player, which has highly evaluated the AFMGC we develop with our partner companies as a next-gen fuelled vessel. We will continue to work with Yara on building an ammonia supply chain from various aspects, not only in the maritime transportation of ammonia," says Hironobu Watanabe, Managing Executive Officer NYK.

Japan's Class NK approves ammonia-fuelled bunker ship

A consortium has received an approval in principle (AiP) for its ammonia-fuelled ammonia bunkering ship from Japanese classification society Class NK. The consortium — including NYK, Singaporean vessel engineering company Seatrium and other undisclosed firms — obtained the AiP on 18 February, NYK Line said. The AiP proved the ship design meets Class NK's safety, technical, and environmental standards.

This marks another step towards implementing ammonia-fuelled vessels. Ammonia's safety risks, including its toxicity, as well as the danger of leaks from piping and tanks are major issues in designing the ship.

The consortium aims to commission the ship by the latter half of 2020s and to operate at the ports in Singapore. The ship will also be assessed by the Maritime and Port Authority of Singapore.

NYK Line and its partners have not decided where to build the ship. NYK Line declined to disclose ammonia bunkering capacity of the vessel. Japan's shipping industry is developing alternative fuels to achieve decarbonisation, and ammonia is one of the key potential bunker fuel. NYK Line and its other partners — domestic

FREIGHT RATES

POTASH	Price type	Units	Timing	Low	High	Date
Dry potash Vancouver - China 60-65kt	outright	USD/t	prompt	22	24	20-Feb-25
Dry potash Red Sea - WC India 25-30kt	outright	USD/t	prompt	21	26	20-Feb-25
Dry potash Baltic Sea - Brazil 30-40kt	outright	USD/t	prompt	45	60	20-Feb-25
Dry potash Baltic Sea - SE Asia 25-30kt	outright	USD/t	prompt	70	105	20-Feb-25
Dry potash Vancouver - SE Asia 25-30kt	outright	USD/t	prompt	51	53	20-Feb-25
Dry potash Baltic Sea - China 60-65kt	outright	USD/t	prompt	60	85	20-Feb-25
Dry potash Baltic Sea - US Nola 50-55kt	outright	USD/t	prompt	50	65	20-Feb-25
Dry potash Vancouver - Brazil 30-35kt	outright	USD/t	prompt	41	43	20-Feb-25
Dry potash Hamburg - Brazil 30-35kt	outright	USD/t	prompt	22	24	20-Feb-25

SULPHUR	Units	Low	High	Date
50-60kt – Vancouver-China	USD/t	26	28	20-Feb-25
Below all 30-35kt				
Mid East – EC India	USD/t	18	20	20-Feb-25
Mid east – North/River China	USD/t	24	26	20-Feb-25
Mid East – South China	USD/t	20	21	20-Feb-25
Mid East – Brazil	USD/t	24	26	20-Feb-25
Mid East – North Africa	USD/t	30	38	20-Feb-25
Mid East – South Africa	USD/t	20	21	20-Feb-25
Black Sea – North Africa	USD/t	35	45	20-Feb-25
Black Sea – Brazil	USD/t	45	55	20-Feb-25
Baltic – Brazil	USD/t	40	45	20-Feb-25
Baltic – North Africa	USD/t	35	45	20-Feb-25
35-40kt – US Gulf - Brazil	USD/t	21	22	20-Feb-25

shipbuilder Nihon Shipyard, engine developer Japan Engine and IHI Power System — also secured an AiP for their 40,000m³ ammonia-fuelled medium gas carrier in 2024. The ammonia carrier will be built at domestic shipbuilder Japan Marine United's Ariake shipyard in south Japan's Kumamoto prefecture, which is targeting commissioning in 2026.

Brazil eyes 2,400km in waterway projects

Brazil's Bndes development bank and national waterway transportation agency Antaq launched a request for proposals seeking public-private partnerships to develop 2,400km (1,491 miles) of waterways in the north.

The projects would include dredging, adding monitoring and security infrastructure to allow the rivers to support more commercial traffic. The projects would include 650km in the Tapajos River and 1,750km in the Tocantins River, in northern Para state.

The Tapajos stretches considered for the projects are between Itaituba and Santarem cities, as well as between Breves and Abaetetuba cities.

The sections of the Tocantins being considered are between the Vila do Conde port and the river's mouth and between Maraba and Barcarena cities. Both stretches already have commercial activities, according to Bndes.

The project aims to unlock investments to expand both river's capacity through dredging works, monitoring and security improvement, Bndes said.

The Barcarena port can handle 7.2mn t/yr of cargo, while the Itaituba port handles 6.5mn t/yr, according to Para's port authority Docas do Para.

The projects have the potential to increase transport capacity by tenfold in these waterways, Bndes said, but it is not clear how much the waterways can transport now.

The Tocantins river transports grains, dry and liquid bulk cargoes, coking coal, fertilizers and aluminum. The Tapajos river transports grains from the center-west — Brazil's main agricultural region — and neighboring states, LPG and liquid bulks.

Petrobras to further expand marine fleet

Brazilian state-controlled Petrobras launched an open call to purchase another eight LPG tankers as part its fleet expansion and revamp program, after it hired 16 other ships since December.

The open call comprises of five pressurized ships for LPG transport and three semi-refrigerated ships for LPG and ammonia transport, the company said during a maritime industry event it held at Angra dos Reis, in Rio de Janeiro state.

Among the pressurized ships, three can carry up to 7,000m³ and two can carry up

to 14,000m³. The semi-refrigerated ships can transport up to 10,000m³ each.

The open call will be public and international. It will contain two slots, one for each type of ship. Still, the two slots cannot be filled by the same shipyard or consortium, Petrobras said.

Petrobras' oil transportation and logistical arm Transpetro will have 14 gas ships — up from their previous six ships — in its fleet after the acquisitions. Meanwhile, Transpetro's transport capacity will reach 108,000m³, threefold from the previous 36,000m³, Petrobras said.

Petrobras also purchased four bulk carriers and 12 support ships in the past two months. The gas ships are set to consume 20% less marine fuel, according to Petrobras. The new fleet will also reduce greenhouse gases (GHG) emissions by 30%, the company said. But the company did not give reference points for either the fuel consumption nor the GHG emission.

The company expects to hire another 10 ships for support and emergency responses, eight ships for inspection and submarine operations and two ships for platform anchorage, Petrobras said. In 2023, President Luiz Inacio Lula da Silva vowed to expand Transpetro's marine fleet, saying the firm would focus on renewable fuels.

EU import tax move could shift Russia urea flows

The European Commission has drawn up a proposal for gradually increasing tariffs on Russian nitrogen-based fertilizer imports from July — something that would have significant ramifications for urea trade flows. Russia is the EU's second-largest urea supplier, behind Egypt, accounting for 1.52mn t of the bloc's 9.8mn t of receipts in January-November, latest trade data show.

The proposal is for an initial extra levy of EUR40/t from 1 July, on top of the existing 6.5% duty. The tariff would then increase to EUR60/t from 1 July 2026, then EUR80/t from 1 July 2027 and EUR315/t from 1 July 2028 — again, on top of the existing 6.5% duty.

NITROGEN/UREA		Units	Low	High	Date
Middle East - US Gulf	45kt	USD/t	31	33	20-Feb-25
Middle East - Thailand	30kt	USD/t	22	24	20-Feb-25
Middle East - Brazil	40kt	USD/t	22	24	20-Feb-25
Baltic - Brazil	30kt	USD/t	35	40	20-Feb-25
China - India	60kt	USD/t	19	23	20-Feb-25
Algeria - Brazil	30kt	USD/t	21	22	20-Feb-25
Algeria - French bay	12kt	USD/t	18	20	20-Feb-25
Baltic - EC Mexico	30kt	USD/t	39	45	20-Feb-25
Baltic - WC Mexico	25kt	USD/t	57	62	20-Feb-25

PHOSPHATES		Units	Low	High	Date
Morocco – Brazil	30kt	USD/t	19	21	20-Feb-25
Tampa – Brazil	30kt	USD/t	27	29	20-Feb-25
Saudi Arabia – EC India	30kt	USD/t	18	20	20-Feb-25

AMMONIA	Units	Latest	Date
Ras al Khair - Ulsan, 23kt	USD/t	69	26-Feb-25
Ras al Khair - Kakinada, 23kt	USD/t	38	26-Feb-25
Ras al Khair - Kandla, 23kt	USD/t	20	26-Feb-25
Point Lisas - Ulsan, 23kt	USD/t	114	26-Feb-25
Point Lisas - Houston, 23kt	USD/t	30	26-Feb-25
Point Lisas - NW Europe, 23kt	USD/t	49	26-Feb-25
Bontang - Ulsan, 23kt	USD/t	31	26-Feb-25

Poland was the EU's largest recipient of Russian urea in January-November, with 544,000t, while Germany received over 200,000t, and the Netherlands 166,000t. Italy imported 88,000t and France 47,000t. The tariff hikes would make duty-exempt imports from Egypt and Algeria even more attractive. Egypt shipped 2.33mn t to the EU in January-November, while Algerian deliveries totalled 1mn t.

Fresh EU barriers would probably shift more Russian exports towards Turkey and the Americas, west and southern Africa and India — depending on seasonality — challenging Middle Eastern suppliers.

Egyptian producers would find a greater premium for urea in the EU than they would in Turkey, and Algerian product would be less likely to head to Brazil, Canada and the US — particularly during Europe's spring season. Central Asian producers that ship from Black Sea ports would also benefit from the displacement of Russian flows, especially suppliers of Uzbek granular urea, which is duty-exempt in the EU. The commission's proposal will next be considered by Europe's legislative bodies.

Trafigura completes joint ammonia, LPG shipment

Trading firm Trafigura has completed the first ever transatlantic co-shipment of ammonia and LPG. Midsize gas carrier the Green Power, on a time charter to Trafigura, loaded an ammonia cargo from Donaldsonville on the US Gulf coast on 25 November. It then loaded a propane cargo from the Corpus Christi terminal on the Gulf coast on 30 November. The co-loadings into separate tanks on the same vessel required permission from the US Coast Guard and planning between the ports, shipowner Purus and ship-to-ship (STS) transfer specialist International Fender Providers (IFP), Trafigura says. The LPG cargo was discharged on to large gas carrier Tokyo via an STS near Augusta port, Italy, on 21 December. The ammonia was unloaded at Teesport, UK, on 3 January. The ship was carrying 68,200 bl (5,500t) of propane and 185,900 bl of ammonia, Kpler says. ■

Price watch

*These market insights are provided by **Argus Fertilizer Analytics team***

AMMONIA

US import market expected to warm up

Prices fell at all major benchmarks in the first month of 2025, as it was the off-season in most major fertilizer demand hubs, which allowed prices to move down from the peaks seen in November-December. This trend is expected to continue, with global supply sufficient to cater for the little spot demand that exists.

Europe is the only region buying with any vigour at present, driven by improved downstream fundamentals as nitrates prices have risen owing to higher natural gas and urea prices. Production rates are generally high and stable, with strong output from Trinidad and the Middle East compounding the downward price pressure. A short gas-related outage affecting all Algerian producers caused a stir at the end of January, especially given Europe's appetite for Algerian ammonia at present, but this only lasted for four days and is unlikely to impact availability.

The standalone strength of the European market has pushed cfr pricing to a premium to the typical spreads between fob pricing, with cfr northwest Europe including duty last priced at a USD90/t premium to the fob Caribbean price. A USD230/t arbitrage has opened up between the fob Middle East and cfr northwest Europe benchmarks, but the logistical challenges posed by shipping around the Cape of Good Hope, combined with an estimated USD190/t freight charge for a return journey and vessel logistics, mean that this opportunity has not yet been fully exploited.

On the demand side, there is unlikely to be any improvement in the near term – Indian downstream producers typically perform plant turnarounds at this time of year, and east Asian demand is showing no signs of picking up. The precarious position of industrial chemicals producers in Japan, South Korea, and Taiwan was highlighted when Japan's Ube announced its medium-term strategy to halt ammonia production for its caprolactam operations by March 2028.

China's expansion into the caprolactam and acrylonitrile sectors in recent years has flooded the market with low-cost product, reducing the economic viability for producers in other east Asian countries, which have higher ammonia production costs or have had to rely on the volatile and elevated traded ammonia market.

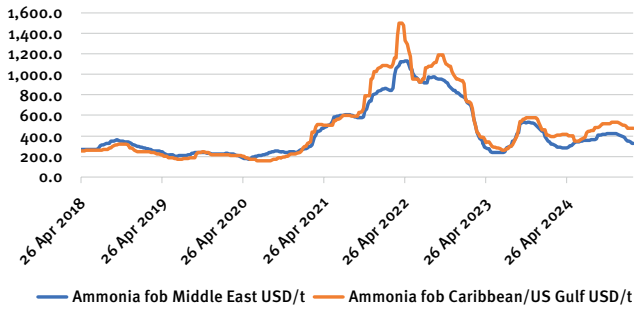
The US import market may start to warm up ahead of the spring fertilizer application period. This would lend some stability to pricing outside of European markets, but the effects will not be felt in earnest on the seaborne market until March. It is expected to be a bumper application season in the US this spring, following a weak autumn because of adverse weather throughout much of the application window, leaving many farmers behind on their nitrogen applications.

Corn futures are bullish, raising the expectation for spring corn acreage, and by implication raising the expected direct application of ammonia. But some of this increased demand will be offset by the start-up of Gulf Coast Ammonia's 1.3mn t/yr unit. The plant is in the commissioning stage, lending support to expectations for commercial production by March-April. Around 60% of the plant's output is thought to be contracted to OCP in Morocco, but some supply will be available to the spot market.

US president Donald Trump enacted broad 25% tariffs on imports to the US from Canada and Mexico on 1 February. There had been hope that tariffs would be delayed, so many ammonia importers opted for a reactive strategy. The US typically imports around 90,000 t/month of ammonia from Canada, but it is too soon to say how this will be affected by the new tariffs. Most Canadian capacity is far from the coast, so there are no obvious alternative export options.

Prices at all forecast benchmarks will come under renewed downward pressure from May, as demand recedes in the US, Europe, and India and new capacity comes on stream in the US, along with an increase in exports from Russia's Ust-Luga port. Support for prices will return as demand picks up seasonally from September, and momentum will build throughout the fourth quarter as application begins in most major demand centres.

Ammonia historical pricing



There is still significant upside risk in our forecast as the market does not have many alternative supply options in the event of sustained major outages. Changes in natural gas prices in Europe are a concern, and any other unexpected shocks to the market could lead to significant deviations in prices from our predicted values.

PHOSPHATES

US and European buying picks up for spring

The phosphate market is undergoing a period of general price stability, but this is expected to break down in the near term, as demand from major markets emerges simultaneously. With prolonged demand from Ethiopia, restricted exports from China, and India's low DAP inventories with a narrowing window to kharif, suppliers are able to push for higher fob levels in the coming months. DAP fob Morocco is expected to firm over the next two months as a result.

India's government has secured significant DAP and TSP volumes from OCP, which will temper price increases alongside affordability hurdles, but in our view, it will not be enough to prevent further firming. Similarly, Chinese fob levels will remain firm until April, after which exports will ramp up, leading to softening prices from May to August, as the global balance is pushed into a surplus and there is higher competition among suppliers to service South Asia.

But the price reductions will be modest, because of healthy out-of-season buying in India to replenish inventories. Then DAP prices will start firming again in September as the market moves into deficit heading into the fourth quarter. Prices will firm and stabilise, as restrictions are reintroduced ahead of the Chinese domestic season and strong demand from South Asia.

Looking west, in Europe, supplier prices will firm slightly because of a narrowing buying window for the spring season, but this will be limited by sporadic demand for phosphates. The European Commission (EC) has proposed tariffs on fertilizers from Russia and Belarus, including DAP, MAP, NPs, and NPKs, effective from July. If implemented, Europe will rely more on North African and Middle Eastern suppliers, as Russian volumes may be redirected to other regions, which could boost prices to attract volumes from other destinations.

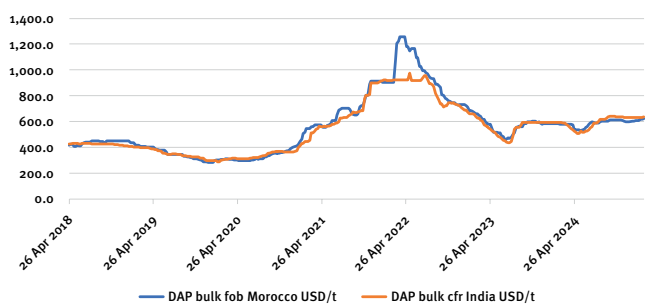
Phosphate prices in the US are firming, alongside increased activity and concerns over tighter supply, despite higher carryover for spring. Rising corn prices have improved farmer affordability, boosting interest in P_2O_5, as the spring season approaches. Meanwhile, potential tariffs on Mexican fertilizers could further tighten supply, especially for MAP.

DAP fob barge is expected to rise, particularly on the high end, to compete with Saudi netbacks from other regions. A shorter spring is forecast, leading to a rapid but short-lived spike on the top end, creating a wider spread. Prices will soften from May to August, with some periods of stability. By the fourth quarter, prices will firm again as the global DAP balance remains in deficit, and US surplus carryover is exhausted.

In Brazil, MAP prices have remained stable at USD635/t cfr for seven months. This equilibrium is expected to change soon as buyers, after strong potash purchases, now seek phosphates. With the import window narrowing, MAP cfr Brazil will stay stable in the near term, but buying interest will exceed supply, causing prices to then climb temporarily.

Yet, despite the short buying window, SSP deals will continue to be favoured, tempering MAP price gains. Starting in May, Chinese export restrictions will ease, leading to a quick increase in shipments to Latin America to ensure timely delivery. By July, Chinese shipments will be less attractive because of longer travel times, and supply will tighten as producers shift focus to DAP markets by the end of the third quarter. Consequently, MAP cfr Brazil is expected to rise in August and September, aligning with seasonal trends. But this increase will be moderated by strong demand for superphosphates and the expansion of domestic production capacity.

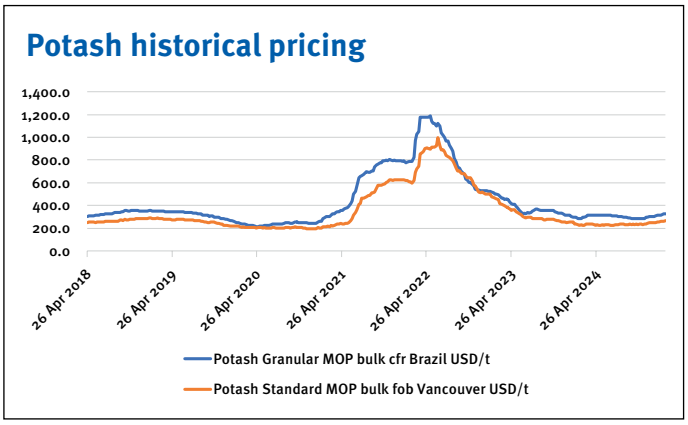
Phosphates historical pricing



POTASH

US, Brazil prices continue to climb

Prices globally remain firm, and offer prices continue to rise in all regions. The most prominent movements are in the West, where US domestic prices have ticked up by USD10/st on the back of uncertainty over tariffs on Canadian imports, following a USD22.50/st increase last week at the mid-point. Brazilian granular MOP prices have also increased again, by USD5/t at the low end, as more sales for March loading were concluded. Fresh offers in these markets are higher.



In the East, some standard MOP offers have risen to USD330/t cfr for April shipment. Granular MOP offers in Vietnam and Thailand have also risen to USD340/t cfr, supported by increasing domestic prices, particularly in Vietnam. In Europe, some suppliers intend to raise MOP prices by EUR 15-20/t.

MOP port stocks, including those in bonded warehouses, have fallen to 2.78mn t. Tightening supply and an expectation of rising demand in the coming weeks continue to push up Chinese domestic prices.

NFL has issued a tender seeking 60,000 t of standard MOP, closing 3 March, after it failed to purchase the same volume under its previous tender.

MOP prices are likely to remain firm until there is more certainty over the possible US tariffs on Canadian imports in March. Even if the tariffs are not imposed, supply remains tight going into the second quarter, which will support higher offers. Meanwhile, SOP prices are set to remain elevated over MOP. This is because of limited export availability out of China, the lingering effect of sulphur shortages in Europe, and healthy demand for SOP.

SULPHUR

High domestic demand pushes Russian sulphur exports down

We expect global sulphur pricing to continue firming over the based on demand from key markets such as Indonesia and to remain stable across the second quarter, supported by DAP market pricing, before dipping in June as seasonal demand drops off in the third quarter. More bulls than expected have emerged this quarter, with few indications of softening in March, April, and May.

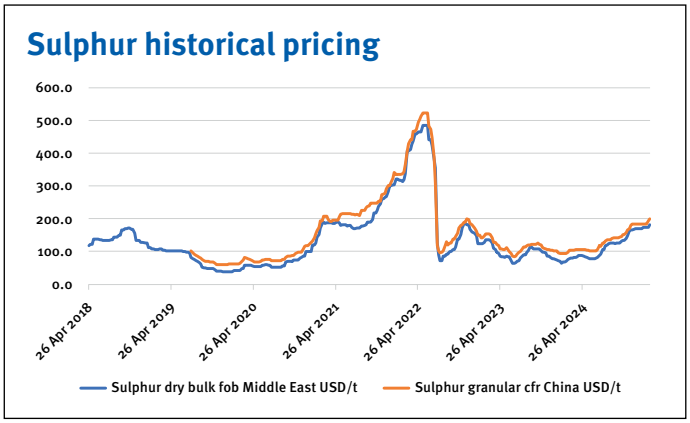
Stable-to-soft pricing of sulphuric acid on a global scale is a potential softening factor, alongside news that Norwegian fertilizer producer Yara has halted phosphoric and sulphuric acid output at two units in Brazil, but we do not expect these to significantly temper the expected sulphur price increase based on current factors for stability and firming.

Key short-term firming factors include steady demand from Indonesia, which continues to prop up Middle Eastern fob pricing. There is a new nickel high-pressure acid leach (HPAL) project with associated sulphur burning capacity coming online this year, alongside regular nickel matte-based demand and consistent operations at existing HPAL operations giving support to pricing for the rest of this year. There is also the risk of Indonesian buyers absorbing additional spot tonnes from the Middle East, driving up competition and pricing for tonnes for other key end-user markets.

Demand from fertilizer producers in both China and Brazil is expected to emerge, but they now are covered by stocks and arrival tonnes, which is adding to the stable market sentiment. The loss of the Ethiopian Agricultural Businesses (EABC) tender for Morocco also will contribute to market stability this year, with a jump in Moroccan phosphoric acid production no longer expected but instead steady production, which is generating sulphur demand to meet finished fertilizer agreements with India and other market participants.

The DAP market is also firming to April based on low DAP stocks in India and export restrictions in China, giving support to sulphur pricing over the next few months. The loss of Russian volumes as a result of the winter closure of shipping routes, combined with the uncertain outcome of sanctions, has meant there are fewer tonnes available and that western buyers are facing higher-priced tonnes from alternative sources. Adding to this shortfall are refinery maintenances that are taking place or scheduled either currently or in the first half of this year, contributing to the overall firming sentiment with turnarounds in the US Gulf, western Europe, the Mediterranean, and India.

Longer-term firming factors include US president Donald Trump's 25% tariffs on imports from Canada and Mexico, where it is understood that sulphur is expected to come under the 25% bracket rather than the 10% tariff for energy imports. Ultimately, the impact of the tariffs is uncertain, but US Gulf spot prices are already firming, and we expect pricing in the US to be pushed up, creating a sulphur



premium. Less sulphur could be recovered in the US because of a potential change in crude slates or lower volumes of Canadian crude imported into the region.

There is a limit to sulphur-forming capacity in western Canada, but we could see increased volumes on offer to offshore markets, particularly now with the operational South Cheecham facility in Alberta. This could further push up pricing for Canadian supply to the US. Kazakh stocks at Kashagan are expected to diminish and be depleted by July this year. This is also a potential firming factor for the second half of 2025 and into 2026 as Kazakh exports of crushed lump will be significantly reduced, adding to global market tightness.

Argus' global sulphur trade balance across the forecast period shows a firm deficit in the second half of this year, adding upward pressure to pricing as the availability of tonnes becomes tighter based on market fundamentals. This is likely to help keep a floor to any seasonal downturn.

NITROGEN/UREA

Short market for medium term

Urea prices rose by USD40-50/t recently, which was slightly more than we forecast in the previous report. The main driver of the increase was a realization of how short supply in the market will likely be over the next 60-90 days. Highlighting this, Indian buyer RCF only secured 560,000 t under its 23 January tender, despite prices rising by more than USD50/t since India's previous purchases.

The main question now is how much higher prices will rise. Egyptian fob prices edged up to USD440/t fob, while Middle East prices rose more rapidly to reach USD415/t fob. In both cases, there is room for further price increases. Other prices will adjust to these leading indicators.

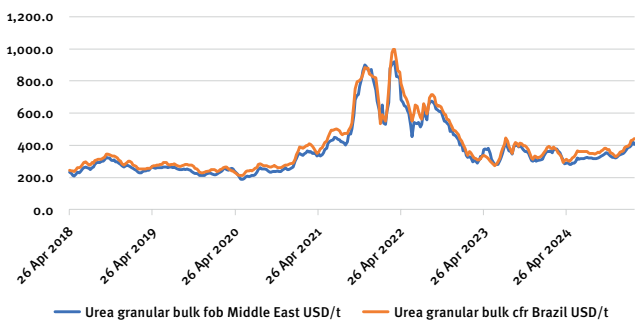
Cfr prices are lagging, as is usual in times of rapid change, but they will likely respond in due course. The major destinations for February-March cargoes are the US, Europe, Australia, and India.

India will need to issue a further tender after two relatively unsuccessful tenders in December-January, which netted only about half of the required 1.5mn t. It will pay the lowest price it is offered, probably based on Middle East spot pricing for March.

Australia takes mainly formula-priced cargoes under contract and will also end up paying whatever the prevailing Middle East fob price is at the time of shipment.

The European market is more complex. Importers have bought Egyptian and Algerian urea at USD410-430/t fob. The need for prompt shipments undermines any resistance put up by buyers in the region. Turkey also remains short of urea in the absence of Iranian supply.

Urea historical pricing



A similar situation can be seen in the US, where demand for urea to arrive in time for when rivers open in March is putting pressure on loading schedules from the Middle East and Africa. Prices have reached USD420/t cfr equivalent and will rise further, as buyers concede to pay up for timely arrivals.

US president Donald Trump's threatened imposition of a tariff on Canadian exports to the US, and a potential retaliatory tariff announced by the Canadian president, could penalize farmers and producers in both countries by driving up prices and/or pushing down netback prices to the factories. Canada exported about 600,000 t of urea to the US in 2024, while US suppliers shipped close to 700,000 t to Canada.

The tariffs may lead to some reorientation of trade, with offshore cargoes replacing some US deliveries into eastern Canada. But Canadian exporters, based mainly in Alberta and Saskatchewan, have no alternative markets to sell to besides the US.

The supply deficit forecast for March is very large and suggests that prices from some origins could approach USD470-480/t fob at their peak. Affordability will become an issue in some countries, but the trade balance indicates it will not push prices down for March, as there will still be sufficient demand from countries able to afford the higher prices. Spot supply for loading is largely committed, and buying is now starting for March, with trading companies and importers trying to get ahead of the curve.

The higher prices go, the faster they are likely to fall in the second quarter. Trading firms will seize the opportunity to sell short, while buyers will become increasingly wary of committing to supply they may have to carry over. And Iranian and possibly Chinese urea could return to the market.

Fob prices dropped below USD300/t from the Middle East in April last year, after prices started trending down in March. Indian buying is likely to continue through to March this year, so the price downturn is expected to start later — although the extent of the fall could be equally severe as last year. ■

Special focus

LOW CARBON FERTILIZERS ›

Transition engineers take on the fertilizer decarbonization challenge

Written by

Florian Ahrens, *MSc Process Engineering, PhD Candidate,* and
Dr. Susan Krumdieck, *Professor and Chair in Energy Transition Engineering,* ***Heriot-Watt University, UK***

We usually think of decarbonization in terms of new technologies or supply chain substitutions to address emission problems. However, recent transition engineering research on the decarbonization of nitrogen fertilizers has uncovered previously unexplored opportunities for the fertilizer industry to approach decarbonization as a systemic transition.

The fertilizer decarbonization challenge

Nitrogen fertilizers are essential agricultural inputs, and are economically manufactured and supplied at scale using natural gas for feedstock and energy supply. They work excellently, the production is legal, meets health and safety standards and is profitable for the involved industries. Nitrogen fertilizers provide essential nutrition to people worldwide. However, fertilizer production continues to deplete finite resources and is, therefore, not sustainable. Despite this, we cannot simply 'stop' industrial fertilizer production, as modern agricultural systems rely on artificial fertilizers to function. At the same time, the eutrophication and greenhouse gas emissions resulting from intensive industrial agriculture enabled by fertilizers are harmful – and this has prompted proposals for greener and more sustainable solutions, such as electrolytic hydrogen from renewable energy sources or organic fertilizers. Additionally, reducing animal product consumption could help lower emissions across the broader agricultural system.

There is growing pressure on the fertilizer industry to meet government emissions targets, reduce pollution, and decrease reliance on natural gas. However, implementing significant changes in infrastructure, technology, processes, or dietary habits remains challenging due to entrenched infrastructure, financial commitments to conventional agricultural practices, and established behaviours. For instance, in 2020, the German agricultural sector had a liability-to-asset ratio of approximately 30%, with total outstanding loans amounting to EUR52 bn.

A "wicked" problem

In our recent paper, we diagnosed fertilizer decarbonisation as a "wicked" problem. Wicked problems are complex and challenging to address locally because of global value chains. They are immune to typical linear problem solving found in engineering due to their circular nature and urgent time scale. Wicked problems involve emergent systems behaviour. Thus, new energy technologies imposed by policy or planning cannot substitute into a complex emergent system without adaptations in the design and operation of incumbent systems.

Transition engineering tackles wicked problems by focusing on essential needs from different perspectives, and investigating the wicked problem paradoxes. The "Wicked Problem Investigation" is not expected to yield solutions, rather it allows a change of perspective to see the issue at the heart of problem.

Figure 1 illustrates the investigation of the fertilizer decarbonization wicked problem, focusing on the essential

role of fertilizer manufacturers. As businesses, they must meet customers' needs and provide affordable farm inputs. However, fulfilling this need causes harm throughout the entire fertilizer and agricultural value chain. Consequently, the sustainability of society now depends on the unsustainability of a socio-technological enterprise. The investigation revealed a core issue for the fertilizer industry: the standard best practices are inherently unsustainable.

Applying the transition engineering approach

German agriculture was used as a case study for fertilizer decarbonisation. Transition engineering employs a systemic design approach called "Interdisciplinary Transition Innovation, Management and Engineering (InTIME)" design for tackling wicked problems in a stepwise process.

Figure 1. Investigation of opposing wicked problem poly-paradoxes in the fertilizer decarbonisation challenge

Step 1: History

We investigated the history of fertilizer and the supply of amendments using a systems learning approach. An interesting insight was that past fertilization methods were not necessarily sustainable. Examples include the application of manure and bone meal, the cultivation of legumes in crop rotation, the extraction of sodium nitrate from the Atacama Desert in Chile, and the collection of seabird guano from islands near Peru.

Industrial agriculture developed alongside industrial ammonia production, benefiting from improvements in efficiency, safety, and standardized practices in chemical engineering. The availability of low-cost imported natural gas enabled affordable fertilizer production and facilitated highly efficient industrial agriculture, achieving the lowest land, energy, and fuel use per unit of food production in history. However, this system remains wasteful and unsustainable due to over-fertilization, dietary habits, and food waste.

Step 2: Current system

Qualitative and quantitative stock take was carried out involving interconnected energy and resource consumption, policy, governance and behaviour landscapes surrounding the essential activity. In 2019, agriculture was responsible for 8.2% of Germany's emissions, primarily from energetic fermentation in the gut of animals, N_2O volatilising and leaching from agricultural soil, manure management and the production of nitrogen fertilizer. Ammonia for nitrogen fertilizers is mostly synthesized in the Haber–Bosch process using fossil gas feedstock.

Figure 2 is an input-output flow model of the agriculture system, which in Germany has estimated 11.4 Mha (62%) of agricultural land dedicated to livestock. Our analysis shows that nitrogen-fertilizer production consumes 1.5 * 104 GWh/a (5.40 * 10^4 TJ/a) of primary energy. Germany uses 1500 kt of artificial nitrogen, of which 450 kt leach into soils and waterways and 150 kt volatilize as N_2O.

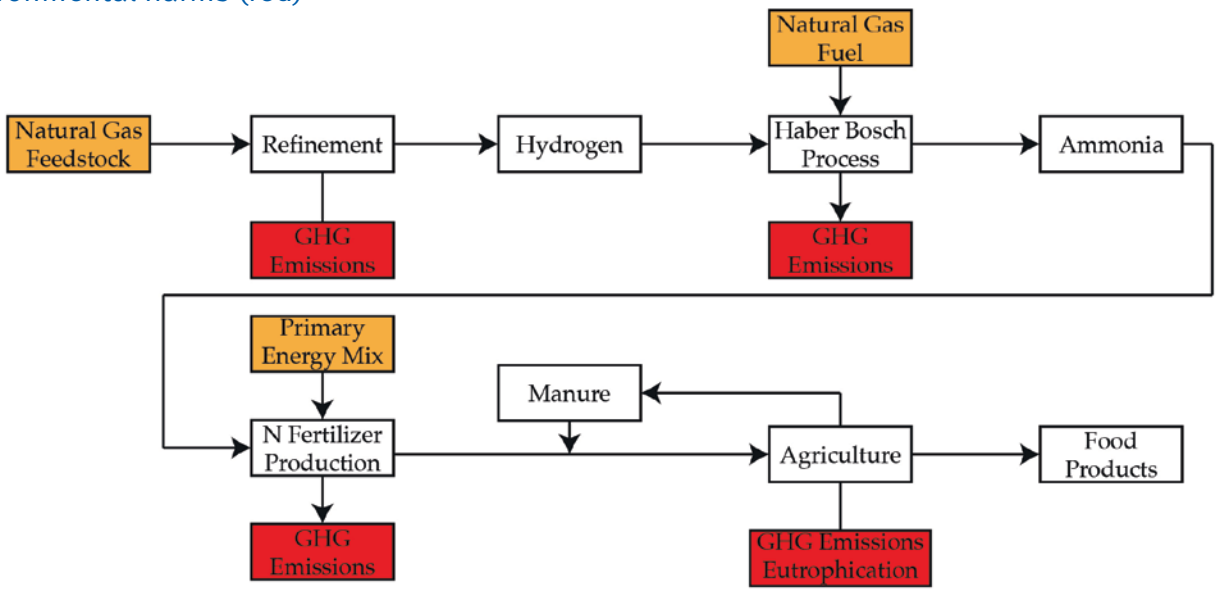
Step 3: Future scenarios crash test of options

The "crash test" uses risk analysis to assess the unsustainability of the future trajectories of policies, sustainability strategies and industry plans.

Substituting hydrogen from renewable electricity electrolysis for natural gas in the artificial fertilizer manufacturing is the most popular policy in Germany. The results of our modelling show that 16.1 GWh/a of energy would be required for the electrolysis, assuming combination of wind power, PEM electrolysis and Li-Ion batteries. This translates into 6.12 GW of installed wind generation capacity, 3.06 GW of electrolysis capacity and 116.6 GWh battery capacity. For reference, this equals to approximately 10% of current wind power capacity, 30% of the proposed electrolysis capacity for 2030 and 8,200% of the current large scale battery storage capacity.

The GHG emissions reduction compared to the conventional process is 4.6 mn t CO_2eq/a. The

Figure 2. The agriculture food production system with fossil-carbon inputs (orange) and environmental harms (red)



added lifecycle emissions from the new capital equipment are 0.25 mn t CO_2eq/a for wind turbines, 0.04 mn t CO_2eq/a for electrolysers, and 0.94 mn t CO_2eq/a for batteries. The capital investments are EUR25,713 mn for the wind turbines, EUR1,041 mn for the electrolysers, and EUR58,307 mn for the batteries. Iridium is required for the electrolysis with a total loading of 2.3 t. The batteries require a cobalt loading of 56 kt and graphite loading of 187 kt.

This scenario would reduce the natural-gas consumption for nitrogen fertilizer production to zero. However, the scenario has the same biodiversity loss and eutrophication as the current system, since no change in diet, fertilizer use, population size or agricultural practice are assumed. Results show that the reduction of emissions from the fertilizer production only marginally reduces the emissions of the overall agricultural sector because emissions from the production of ammonia are significantly lower than emissions from the agriculture system. The energy use rises to 214% over the current operations due to technological inefficiencies and the embedded energy in the renewable energy infrastructure. The cost of the new infrastructure is more than one-hundred times (12,753%) that of today's German agriculture GDP. Both iridium and cobalt need more than seven years of Germany's share in the global production.

The crash-test results show that the green hydrogen scenario for fertilizer production is not feasible for immediate massive decarbonisation. The costs are high, the scenario depletes precious materials and consumes more energy than the current system. The required energy infrastructure for the production and handling of green hydrogen would exceed sensible wind power, electrolysis and battery capacities. Therefore, green ammonia is not a cost-effective or energy efficient option for fertilizer system decarbonisation.

Step 4: 100-year view of agriculture amendment supply industry

The fertilizer industry encompasses a highly skilled workforce, established supply chains, process plant infrastructure, and in-depth knowledge of the fertilizer and agricultural system. Identifying inefficiencies across the entire system—from fertilizer production and agricultural practices to end uses—would enable better utilization of existing assets. Our results indicate that inefficiencies arise less in highly optimized industrial processes and more in end uses, such as food waste along the supply chain or excessive animal product consumption.

The core issue of this wicked problem is the dissonance between the sustainability of human societies and the normalization of currently unsustainable agricultural systems. The transition engineering requirements for a sustainable agricultural system, including the fertilizer industry, involve reducing fossil fuel consumption and mitigating associated environmental harms within biophysical limits.

How, then, can the industry drive a frugal yet high-value utilization of fertilizers while ensuring business viability? The wicked problem of fertilizer decarbonization has no straightforward solution, but change is necessary. As a future direction, we propose investigating how the industry can lead this transformation and capitalize on transition engineering to create a less unsustainable system that ensures a reliable and sustainable supply of amendments. ■

The future of fertilization

How biodegradable CRFs are transforming agriculture

Written by

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and
Kirsten Brandt, *Freelance Content & Communication Specialist,* ***The Netherlands***

As the demand for sustainable agricultural practices grows, controlled-release fertilizers (CRFs) play an increasingly vital role in improving nutrient efficiency and minimizing environmental impact. By gradually releasing nutrients in sync with crop uptake, CRFs reduce losses from leaching and volatilization, contributing to healthier soils and improved crop performance.

A major advancement in this field is the development of faster biodegradable coatings for CRFs. These coatings are designed to break down faster naturally, addressing concerns over long-term soil accumulation of non-degradable materials. With new EU biodegradability regulations set to take effect in 2028, the industry is rapidly innovating to meet these requirements.

This article explores the latest advancements in biodegradable CRF coatings, their role in enhancing nutrient use efficiency (NUE), and their potential to transform sustainable agriculture.

Biodegradable coatings for CRFs

Traditional CRFs use polymer or resin coatings to control the release rate of nutrients. These coating technologies have been proven consistently successful during the entire growing season.

It's no surprise the EU has introduced a requirement for faster biodegradable CRFs

However, the announcement of the European Commission's biodegradability criteria for controlled-release fertilizers (CRFs) in the EU, is driving the development of new CRF coating technologies.

The EU regulation, effective from 17 October 2028, requires CRFs to be biodegradable in soil and water within a specified timeframe while maintaining their effectiveness. The aim is to enhance sustainable, efficient plant nutrition while further reducing environmental impact. Ronald Clemens, Global Marketing & Portfolio Manager CRF at ICL comments: "The biodegradability or CRF coatings will be assessed through official standardized tests. When the requirements are met, the CRF coating technology will be certified by a Notified Body."

He adds: "It's no surprise that the EU has introduced a requirement for faster biodegradable CRFs. Other regions, including the US and Japan, are closely monitoring these developments and are likely to debate similar regulations in the near future."

First biodegradable CRF on the market

ICL Growing Solutions is the first company to produce develop biodegradable cutting-edge controlled-release fertilizers which meet all new EU Commission's 2028 biodegradability criteria—an impressive four years ahead of schedule. Other companies also indicate that they are working on biodegradable coatings, but ICL is the first who is offering such innovation to the agricultural market. Developed at their R&D facilities in the Netherlands, the new coating technology is named eqo.x.

"Even the production process of eqo.x has been optimized to minimize fossil fuel usage, resulting in a significantly reduced carbon footprint," says Ronald Clemens.

The future of biodegradable coatings for CRFs is promising,

Assessment of nitrogen losses from various urea-based products, including CRF. Field trials, Hungary, 2023

with ongoing research focused on enhancing both performance and sustainability. Ronald shares his insights: "Innovations in coating technology may lead to even faster degradation, enabling more precise nutrient delivery while minimizing environmental impact. Additionally, researchers are exploring how these coatings can be integrated with sustainable farming practices such as precision agriculture and organic farming. This holistic approach has the potential to transform modern agriculture, making it more efficient, sustainable, and environmentally friendly."

CRFs and Nutrient Use Efficiency (NUE)

Nutrient Use Efficiency (NUE) is a key factor in sustainable agriculture, reflecting how effectively crops absorb and utilize the nutrients from fertilizers. Nitrogen, though it is the most essential plant nutrient, also poses many environmental challenges. Conventional N fertilizers often result in significant N nutrient losses due to leaching of nitrates and volatilization of ammonia and N gases such as N_2O. CRFs enhance NUE as the release of nutrients is in a controlled pattern, matching the nutrient uptake patterns of crops and leaving less nutrients unused by the crop prone to losses. Thus, CRFs not only improve crop yields but also reduce the environmental impact by minimizing N nutrient losses.

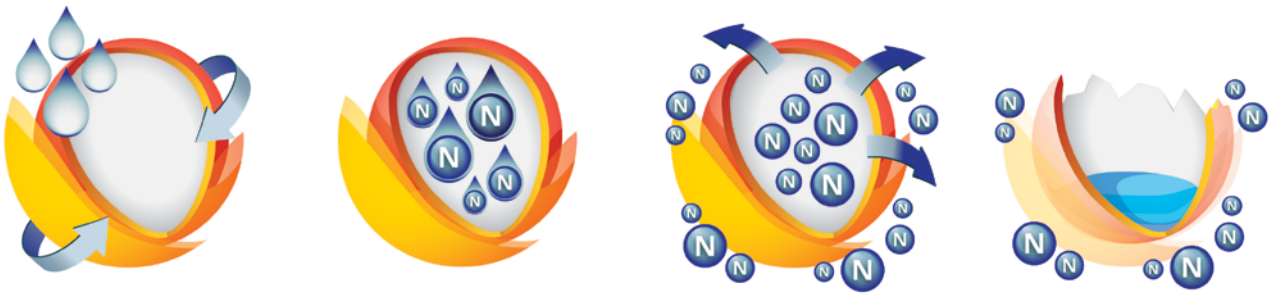
Nutrient Use Efficiency (NUE) is a key factor in sustainable agriculture, reflecting how effectively crops absorb and utilize the nutrients

80% NUE increase thanks to CRF technology

A meta-analysis of 21 previously published studies conducted by Australian researchers highlighted the benefits of CRFs in enhancing NUE. The analysis revealed that CRFs improved NUE by more than 80% and increased crop yields by over 30% compared to traditional urea fertilizers. These findings underscore the advantages of CRFs in optimizing nutrient use efficiency across various crops.

"By reducing nutrient losses, CRFs minimize the risk of water pollution and

Working principle of eqo.x release technology - the engine in ICL's Agrocote and Agromaster products



Once applied in the soil, moisture penetrates the biodegradable coating and reaches the nutrient core

Nutrients inside the granule start to dissolve and begin to release back into the root zone by diffusion

Influenced by soil t°, nutrient solution is released day-by-day through the coating thus reducing nutrient losses

The coating shell degrades in soil into CO_2 and water, offering a sustainable solution for future farming

soil degradation. This makes them an essential tool for sustainable farming practices, contributing to the overall health of agricultural ecosystems," comments Ronald Clemens.

CRF impact on soil microbiome

Additionally, the impact of CRFs on the soil microbiome has been a focus of recent research. Studies have shown that CRFs can positively influence the soil microbiome, promoting the growth of beneficial microorganisms and suppressing unwanted plant pathogens.

A long-term study conducted by Chinese researchers examined the effect of CRFs on plant-growth promoting microorganisms (PGPMs). The study found that CRFs significantly enhanced the population of beneficial microorganisms in the soil, which play a crucial role in nutrient cycling and plant health. The presence of these microorganisms helps in suppressing soil-borne pathogens, thereby promoting healthier crop growth.

Another research conducted by Wageningen University in the Netherlands (unpublished) further supported the positive impact of CRFs on the soil microbiome. The study demonstrated that CRFs positively influenced the plant's microbiome, leading to a more balanced and resilient soil ecosystem. This balance is essential for suppressing unwanted plant pathogens and promoting overall soil health.

Agrocote with eqo.x release technology

Enhancing sustainability for agriculture with CRFs

The development of biodegradable coatings for CRFs and the enhancement of sustainability through improved NUE and soil microbiome health represent significant advancements in the field of sustainable agriculture. These technologies offer a promising solution to the challenges of modern farming, providing a more efficient and environmentally friendly approach to nutrient management, while lowering the carbon footprint of crop production significantly.

Note: Agrocote® and eqo.x® are trademarks of ICL ■

Reducing nutrient runoff

with wet granulation and coating technologies

Written by

Michael Eidge, *Process Sales Engineer, Ch. E.,* ***FEECO International, USA***

Feeding the growing global population relies heavily on the use of fertilizers, but their overuse, or inadvertent misuse, leads to a variety of environmental problems. The primary culprit is nutrient runoff, which sees nutrients migrate to waterways, contaminating groundwater sources and damaging ecosystems through eutrophication (hypoxia).

Wet granulation and fertilizer coating are pivotal techniques in enhancing nutrient delivery efficiency and mitigating environmental impacts in modern agriculture, particularly when it comes to runoff.

Wet granulation

Wet granulation is a non-pressure approach to converting powders and fines into a granular product. Instead of pressure, the method relies on a liquid binder paired with a tumbling action to add layers to particles in an effect similar to rolling a snowball, known as coalescence.

The result is a spherical granule that is more flowable, exhibits far less attrition, and breaks down easily under standard field conditions. The wet granulation process varies depending on product goals, feedstock characteristics, and other factors, but generally involves:

- Mixing (optional)
- Primary granulation in a granulation drum, pugmill mixer, pin mixer, or disc pelletizer
- Drying
- Screening
- Cooling, where desirable
- Recycle

A chemical reaction, such as that used in the production of MAP or DAP, may also occur, with a slurry of the reacted material being fed into a granulation drum for solidification of granules. One common configuration utilizing a pugmill and granulation drum is illustrated in the simplified flow diagram (see figure 2).

Figure 1. FEECO-designed and manufactured on-farm granulation plant

Coating techniques

Coating involves the application of a material, typically in the form of a liquid, onto a solid substrate, often a granular fertilizer. Numerous coatings are available on the market to achieve an array of objectives, from caking and dust prevention to flowability agents and the incorporation of beneficial additives.

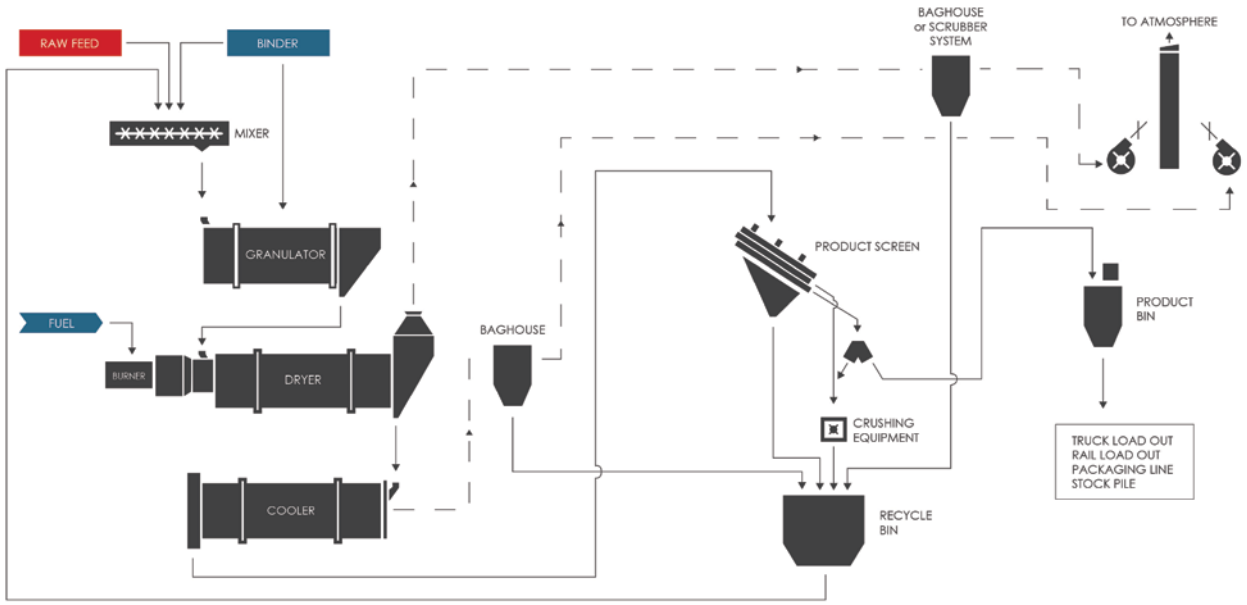
Coating may be carried out using various types of equipment, with coating drums offering a highly uniform result, thanks to the tumbling bed action that occurs within the rotating drum (see figure 3).

Minimizing nutrient runoff

These techniques facilitate the use of agricultural best practices, most notably the 4R nutrient stewardship framework—Right Source, Right Rate, Right Time, and Right Place—by optimizing nutrient availability and minimizing losses.

One of the key ways in which wet granulation and coating contribute to nutrient efficiency and runoff reduction is through the production of complex fertilizers, which offer superior nutrient consistency compared to traditional blends.

Figure 2. Simplified process flow diagram (PFD) of a mixer-granulator setup with drying, cooling, and recycle circuit



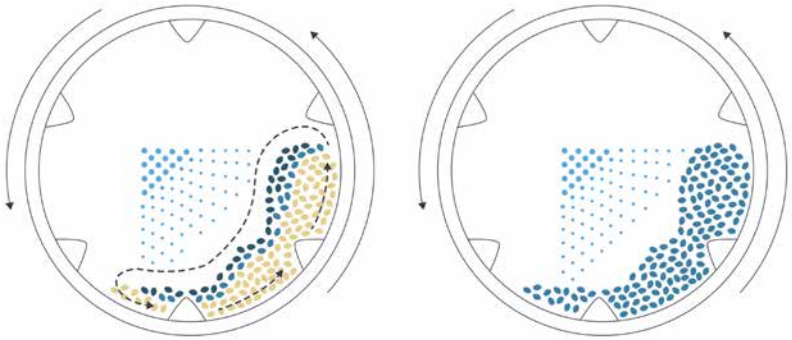
Both wet granulation and coating can be used in the production of complex fertilizers, in which the entire formulation is contained within every granule. Complex fertilizers are increasingly favoured over nutrient blends for their many advantages, particularly in relation to nutrient use efficiency (NUE).

By incorporating the entire nutrient formulation into each granule, complex fertilizers prevent nutrient segregation, a common issue in blended fertilizers where varying particle characteristics cause nutrients to separate during handling and application. This uniformity ensures crops receive a balanced nutrient mix, reducing inefficiencies and nutrient losses.

Blended fertilizers also pose challenges in achieving uniform application because particles of different sizes and densities do not spread evenly. This variability results in uneven nutrient distribution, making it difficult to align with 4R nutrient stewardship principles.

By combining the nutrient formulation into a uniform granular product, growers can avoid the unpredictable distribution associated with segregation and non-uniform spreading.

Figure 3. The tumbling action that occurs within a coating drum ensures optimal bed mixing and promotes uniform coating distribution through granule-to-granule transfer



To fully understand the advantages of complex fertilizers, it is important to examine how wet granulation plays a pivotal role in their production.

The process of wet granulation simplifies complex fertilizer production by allowing for multiple nutrient inputs into a combined granular product.

The self-contained formulation granulation yields, when paired with 4R principles, gives growers the greatest opportunity to deliver the precise nutrition their crops require.

The coalescence used to produce granules also helps to ensure more gradual product breakdown and nutrient delivery, instead of the sudden deluge of nutrients characteristic of powders or granules produced via compaction granulation.

While wet granulation provides the foundation for complex fertilizers, coating serves as a complementary technology that enhances and customizes these products to meet specific agronomic needs.

Coating technology allows fertilizer producers to customize formulations by incorporating additional nutrients or additives. This flexibility enables

quick adaptation to evolving crop and regional nutrient requirements without extensive plant modifications.

Beyond their role in producing complex fertilizers, granulation and coating also influence the physical characteristics of fertilizer granules, which directly impacts their performance in the field.

Controlling particle characteristics

Attributes such as attrition, solubility, and surface-area-to-volume ratio (SA:V) affect nutrient delivery and use efficiency. By controlling these particle characteristics, fertilizer producers give growers the best possible start toward maximizing nutrient use efficiency (NUE) and realizing the full value of their nutrient applications, ensuring maximum return on investment (ROI).

Wet granulation enables control over critical particle characteristics that influence spreading performance, product stability, and nutrient availability. This includes:

- Attrition
- Solubility
- Surface-area-to-volume ratio (SA:V)
- Crush strength
- Flowability
- Particle size distribution
- Compression
- Moisture content

Managing these factors enhances nutrient use efficiency and minimizes runoff. It can also help to prevent application on unintended areas as well. For example, by managing crush strength and attrition, growers and fertilizer producers can avoid product dust, which often leads to nutrients becoming windblown and deposited elsewhere.

Just as wet granulation can modify physical properties, coating techniques provide additional control over fertilizer characteristics, allowing producers to fine-tune performance based on agronomic and environmental needs.

Coatings such as waxes, polymers, and oils have the potential to achieve a number of objectives, including:

Figure 4. Compound blend (top) vs. complex fertilizer (bottom)

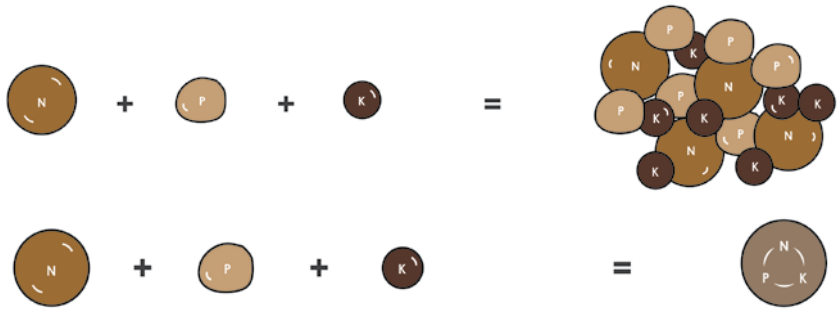
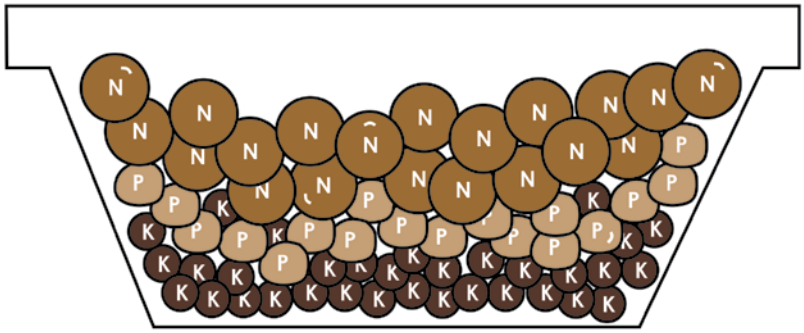


Figure 5. Nutrient segregation, as shown here, is common in compound fertilizer blends due to differences in the physical attributes of the different nutrient particles



- Inhibiting nitrification, or the release of N_2O (a potent greenhouse gas)
- Delaying release (slow-release fertilizers, or SRFs)
- Controlling release (controlled-release fertilizers, or CRFs)
- Improving granule stability
- Reducing potential for caking and attrition
- Enhancing flowability

Recovery of nutrient resources

In addition to optimizing fertilizer performance, wet granulation also plays a crucial role in sustainability by enabling the recovery and utilization of valuable nutrient sources from organic waste streams such as compost and manure.

A vast majority of these nutrient-rich materials currently go unutilized because their existing form is difficult and costly to transport and apply. The nutrients contained within go to waste, removing life-giving nutrients from the closed-loop system in which they continue to feed soil.

In other cases, the moisture-laden form characteristic of these materials leads to applied nutrients being washed away, further contributing to runoff problems.

By granulating these materials, however, they become as versatile as traditional synthetic fertilizers - storable, shelf-stable, efficient to transport, and easy to apply, with a much lower potential for nutrient losses.

Wet granulation is increasingly ensuring that biosolids, compost, dairy manure, and chicken litter are realized for their full nutrient value, particularly as the adoption of digesters continues to rise.

While digesters are primarily employed for biogas production, the addition of a downstream granulation system provides an ideal complementary technology by converting the nutrient-rich cake leftover from digestion into a usable form.

As fertilizer producers look toward the future, the ability to integrate granulation and coating with sustainable practices will be essential in developing next-generation fertilizers that balance efficiency with environmental responsibility.

Figure 6. Urea before *(left)* and after *(right)* wax coating testing in the FEECO Innovation Center

Developing more sustainable fertilizers

The use of granulation and coating techniques in the ongoing pursuit of more sustainable agriculture is still in nascent stages, as producers have only just begun to scratch the surface of how granulation and coating techniques can help to minimize environmental risks.

The success of these products lies in thorough process and product development work, with

facilities like the FEECO Innovation Center, where feasibility testing and process development work are conducted, becoming increasingly critical assets.

Through flexible testing options in both granulation and coating, as well as drying, the Innovation Center provides a controlled environment for establishing feasibility, trialling different formulations, and developing fundamental process parameters. It also provides the data necessary for scaling up and refining the process for continuous commercial-scale production, establishing critical variables such as:

- Feed and product rates
- Drying temperature profiles
- Feedstock pre-treatment requirements
- Spray system configuration (coating and granulation)
- Multi-stage coating requirements
- Liquid feed rates, pressure, and temperature
- Equipment speeds, torque, and amps

Ultimately, testing answers the following questions:

- Can the product be physically made?
- What process configuration will produce the desired results?
- Can the product be produced on a continuous basis?
- Is the intended process economically viable?

Beyond process validation, testing is especially imperative as fertilizer producers explore novel additives and coatings, particularly bio-based materials. Microbes and other biologically based materials hold potential to further improve products and their sustainability but producing them can be challenging; these materials are often sensitive to pressure, handling, and temperature, requiring a meticulous approach to production to preserve the integrity of active ingredients.

The ability to create small test batches for field trials in the Innovation Center further supports innovation, enabling fertilizer producers to evaluate performance under real agricultural conditions before finalizing formulations for commercial use.

Precision agriculture

As the agricultural industry continues to evolve toward greater efficiency and sustainability, wet granulation and fertilizer coating have emerged as essential techniques in reducing nutrient runoff and improving nutrient use efficiency. By facilitating the production of complex fertilizers, optimizing particle characteristics, and supporting the recovery of nutrient resources, these methods directly contribute to the 4R nutrient stewardship framework and precision agriculture goals.

Looking ahead, ongoing advancements in fertilizer formulation, coating technologies, and granulation processes will further enhance the effectiveness of these strategies. Research, testing, and process development, such as that conducted at the FEECO Innovation Center, will be key in optimizing these approaches for commercial-scale production. As fertilizer producers explore novel additives and bio-based materials, continued innovation will be essential in driving sustainability while meeting the growing global demand for food production. By integrating wet granulation and coating into fertilizer manufacturing, producers can maximize agronomic performance, minimize environmental impact, and contribute to a more responsible and efficient agricultural future. ■

Conference preview:

Argus Fertilizer Asia Conference 2025

22-24 April 2025 • Westin Resort Nusa Dua, Bali, Indonesia

The largest Asian fertilizer trading event where industry leaders meet to do business

The Argus Fertiliser Asia Conference takes place in a new location of Bali, Indonesia. Previously held in Abu Dhabi, UAE, Argus is delighted to host the 2025 conference in one of the most exciting fertilizer markets in the Asia Pacific region. Boasting over 450 attendees, 150+ companies, and 50+ countries from across local, regional and international fertilizer markets, this is Asia's largest fertilizer trading event.

This year the agenda features ministerial and industry leader keynote addresses, as well as senior global fertilizer executives discussing the hottest topics in global and APAC fertilizer markets.

Industry leading speakers

Hear from our industry leaders including:

- Rahmad Pribadi, CEO, ***Pupuk Indonesia (Persero)***
- Apit Pria Nugraha, Head of Centre for Green Industry, ***Ministry of Industry, Republic of Indonesia***
- Dr. Harri Kiiski, CEO, ***Brunei Fertilizer Industries***
- Tarek Emam, Vice Chairman, ***Miss Phosphate Company***

Topics covered include key product focuses and regional highlights on critical issues in the fertilizer market right

Exhibition and networking area floorplan

As Asia's largest fertilizer trading event, networking is at the heart of the conference

now, as well as the latest innovations and technological developments, live from our innovation stage – a new feature for 2025.

Networking and discovery

As Asia's largest fertilizer trading event, networking is at the heart of the conference. As such, we've refreshed the exhibition and networking area for 2025.

Dedicated networking lounges and meeting points - Use our meeting points to make locating new contacts seamless. You will find a mix of reserved and unreserved tables to host meetings, and our networking lounges offer a more private setting with sofas and tables. Charging points and further amenities are available.

Indonesia market connections at the Indonesia corner - A new feature of 2025: Chairs and table space allow the area to be used as a meeting point, while enjoying local delicacies and free local giveaways.

Innovation stage - Keep up-to-date with cutting edge market developments and trends at our new innovation stage. Listen to leading companies in the wider agriculture and sustainable fertilizer sectors, and understand the experience of those at the forefront of the industry.

Discover the exhibitors - Uncover product innovators, source new ideas, and establish quality interaction with industry leaders and specialists showcasing their products and services on the exhibition floor.

Extended opportunities for networking

Maximise your informal networking time during our breakfasts, breaks, roundtables and networking and drinks receptions, and design your agenda to make the most of your event experience.

Sulphur and Sulphuric Acid Focus Day – optional add on

Continuing on from the success of its launch in 2024, an expanded **Sulphur and Sulphuric Acid Focus Day,** will take place on April 22.

This includes a unique crossover with the growing nickel segment in Indonesia, with participants in attendance from both the Argus Fertilizer Asia Conference and the co-located Argus Nickel Indonesia Conference.

Leaders from the sulphur and sulphuric acid markets will provide insight into the use of this important commodity by both the fertilizer and nickel markets, informing business strategy, and preparing attendees for meetings during the conference.

A dedicated speed networking session will further facilitate new market opportunities.

Buyers: source sulphur and sulphuric acid from a range of global sellers in attendance. ***Sellers:*** gain access to key decision makers and stakeholders from the global nickel and fertilizer sectors, within the surroundings of the critical Indonesian market.

Revamped - Fertilizer Fundamentals Workshop – optional add on

A revamped Fertilizer Fundamentals Workshop takes place over the two main conference days and offers attendees an overview of market dynamics and the fundamentals, to fully equip participants with the insights they need for meetings and networking.

Presentations from Argus market specialists on key products for the Asia region include:

- ***Nitrogen/urea*** **-** Dana Hjejj, Senior Reporter - Nitrogen, Argus
- ***Phosphates*** **-** Tom Hampson, Editor - Phosphates, Argus
- ***Potash*** **-** Julia Campbell, Editor - Potash, Argus
- ***Clean Ammonia*** **-** Andrea Valentini, VP - Business Development, Argus
- ***Sustainable fertilizers: water soluble fertilizers*** **-** Huijin Yao, Editor - Asia Fertilizer, Argus

Social events

Welcome networking reception (22 April) - sponsored by Misr Phosphate Company

White dress beach party – the first networking reception takes place on 22 April as attendees gather before the start of the conference. The perfect opportunity to meet and networking with peers in a relaxed setting overlooking the white sands Nusa Dua beach.

Sunset main networking reception (23 April)

Enjoy the sunset from the relaxing setting of Temple Garden, at an evening reception on 23 April. Featuring an authentic Balinese temple overlooking a water lily pond, unwind after a busy day of content and meetings.

Argus conferences app

Registered attendees will have access to our exclusive networking app, allowing you to view who else is attending the event and schedule meetings easily and efficiently ahead of the conference. Keep track of your schedule and set reminders for the sessions of the conference you do not want to miss out on.

For more information or to register, visit our website: ***www.argusmedia.com/fertilizer-asia***

We look forward to welcoming the global fertilizer community to Bali next month! ■

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The future growth of the fertilizer market in India

Written by

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India, the world's most populous country, with a population of 1.45 bn, depends heavily on mineral fertilizers to sustain its agricultural output and feed its people. In 2024, food grain production reached 332 mn t, with 55–60% directly attributed to chemical fertilizers, according to several studies. Given the challenges in the current global context, developments in the Indian fertilizer market—consumption, production, and imports—will be intricately linked to nutrient supply, decarbonization, and energy security.

Status of fertilizer industry

According to research, the Indian fertilizer market is expected to grow from USD43.54 mn in 2024 to USD74.06 bn by 2033, with a CAGR of 6.08% from 2025 to 2033. India is the second-largest producer of fertilizers globally, and the market is primarily driven by government subsidies, increasing agricultural demand, and the need for efficient farming practices.

In the current Indian agricultural landscape, major challenges include declining crop response, imbalanced fertilizer usage, the subsidy burden on the exchequer to keep fertilizer prices affordable for farmers, geopolitical uncertainties caused by wars and conflicts in importing countries, and supply chain disruptions resulting from port and traffic restrictions.

Urea is the most widely consumed fertilizer on Indian farms. As per government policy, it is heavily subsidized to one-sixth of its market price and is available at a low cost across the country. However, some Indian farm sectors have experienced declining crop response due to the indiscriminate use of chemical fertilizers, especially urea, highlighting the need for balanced fertilization and an effective action plan for soil health management. Excessive urea use has disrupted soil nutrient ratios, worsened soil degradation, and caused leachates to damage water bodies.

A major challenge for the government is the rising cost of fertilizers and occasional availability issues, particularly for subsistence farmers. Imports are often subject to price fluctuations and supply chain disruptions, both of which contribute to increased subsidies and place a heavy burden on the state exchequer.

Annual fertilizer subsidy expenditure has ranged between USD15–20 bn in recent years, peaking at USD29 bn in 2022–23. The Union Budget for 2025 includes a provision of USD19.4 bn for fertilizer subsidies.

Geopolitical uncertainties, such as political events and international tensions, disrupt fertilizer trade and supply chains, affecting availability, prices, and overall agricultural production. These issues are further exacerbated by transportation and logistical challenges, including port closures and traffic disruptions.

To address these challenges, the government has implemented several initiatives, including adequate provisions for fertilizer subsidies to ensure affordability for farmers, efforts to promote balanced fertilization and sustainable agricultural practices, and various schemes to boost domestic fertilizer production and reduce reliance on imports.

Table 1. Production, import and consumption of fertilizers

	2022/23 (mn t)				2023/24 (mn t)			
Nutrient	N	P_2O_5	K_2O	Total	N	P_2O_5	K_2O	Total
Production	15.74	5.01	-	20.75	17.11	4.88	-	21.99
Import	5.22	3.76	1.46	10.44	4.65	3.14	1.97	9.75
Consumption	20.21	7.92	1.72	29.85	20.46	8.31	1.88	30.65

Courtesy: Fertilizer Association of India

To address challenges the government has implemented several initiatives

Increasing domestic production

To counter supply chain disruptions, the first step is to increase domestic production. Efforts to rebuild five brownfield urea plants, with a total output of 6.35 mn t of urea per year using natural gas as feedstock, have been a success. Among them, only the FCI's Talcher coal gasification-based ammonia-urea complex is yet to be commissioned. Additionally, the government has approved a 0.86 mn t per year urea plant for the public sector Brahmaputra Valley Fertilizer Corporation Ltd. (BVFCL) to replace two older, lower-capacity plants. The Union Budget for 2025 has also proposed a new urea plant at BVFCL's premises in Namrup, Assam, with a capacity of 1.27 mn t per year.

Whenever economically feasible, retrofit and revamp options—such as improved equipment designs, next-generation construction materials, and better-performing catalysts—are easily incorporated into existing plants. Some facilities have also adopted advanced operational practices, including rigorous plant monitoring, digitized process control, and online corrosion monitoring.

The government has been encouraging Indian producers to establish joint venture (JV) manufacturing facilities abroad in fertilizer-rich countries with buyback arrangements and to enter into long-term agreements for the supply of fertilizer inputs or finished products to India. Producing urea in countries where natural gas is available at lower costs has been a successful strategy to ensure a steady supply of urea.

Table 2. Fertilizer joint venture projects

Joint Venture (JV) Project	Year	Partners and equity	Product and annual capacity
Jordan India Fertilizer Co JPMC-IFFCO	2014	JPMC (48%) & IFFCO (52%)	Phosphoric acid 0.48 mn t
Tunisia-India Fertilizer Co, TIFERT	2013	GCT (Tunisia), CIL & GSFC (India), GCT-70%, CIL-15% and GSFC-15%	Phosphoric Acid 0.36 mn t
Oman India Fertilizer Co (OMIFCO), Oman	2005	Oman SAOC-50%, IFFCO 25%, KRIBHCO 25%	Urea, 1.7 mn t
IMACID, Morocco	1999	OCP (50%) – Morocco, Chambal (25%) & TCL, (25%)-India	Phosphoric Acid 0.43 mn t
ICS Senegal, Senegal	1980	ICS (93.22%) -IFFCO (6.78%)	Phosphoric acid 0.55 mn t

Courtesy: Ministry of Chemicals & Fertilizers, Govt of India

Table 3. Import of fertilizer materials 2023/24

Item	Mn t	Country of origin
Products		
Urea	7.04	Oman, China, Russia, UAE, Saudi Arabia, Qatar
DAP	5.57	China, Saudi Arabia, Morocco, Russia and Jordan
Potash	2.87	Russia, Canada, Israel and Jordan
Intermediates		
Ammonia	2.18	Saudi Arabia, Oman, Indonesia, Bahrain and Qatar
Phos Acid	2.26	Morocco, Jordan, Senegal,Tunisia, China and USA
Raw Materials		
Rock Phosphate	8.81	Jordan, Morocco, Togo and Egypt
Sulphur	1.71	UAE, Oman, Qatar, Kuwait and S. Arabia

Courtesy: Fertilizer Association of India

Import of fertilizers

India is heavily dependent on imports in the fertilizer sector, therefore, maintaining a steady supply chain is crucial for the country's agricultural productivity. The overall production deficit, amounting to 30% of total consumption, is met through the import of raw materials, intermediates, and finished products. Imports from surplus regions are managed through canalized agencies by the government to ensure a stable supply chain.

During 2023–24, India imported 15.48 mn t of fertilizer materials, along with raw materials such as sulphur and rock phosphate, and intermediates including ammonia, phosphoric acid, and sulphuric acid (see Table 2).

An optimal supply of soil nutrients over time and space, tailored to crop requirements, can be achieved through the 4R principles—Right Product, Right Rate, Right Time, and Right Place—by implementing crop- and site-specific nutrient management. These broad principles of nutrient administration were developed by the International Plant Nutrition Institute in 1988.

Coating urea with ingredients such as sulphur, neem oil, or polymers, as well as adding micronutrients, allows for the controlled release of nutrients into the soil over an extended period. The nutrient release rate and duration are influenced by coating thickness and soil temperature. Additionally, farmers are educated on the benefits of advanced techniques such as fertigation and

India is heavily dependent on imports in the fertilizer sector, therefore, maintaining a steady supply chain is crucial for the country's agricultural productivity

integrated nutrient management. The large-scale use of compost, farmyard manure, biofertilizers, fortified fertilizers, and micronutrients must be actively promoted.

Specialty fertilizers

Controlling the release of nutrients into the soil through product coating, stabilization with additives, delivery in water-soluble or liquid forms, and chelation with crop-specific micronutrients are all efforts to enhance the value of common fertilizers and significantly improve nitrogen use efficiency. The International Fertilizer Association (IFA) has identified controlled-release fertilizers (CRFs), slow-release fertilizers (SRFs), sulphur-coated urea (SCU), stabilized nitrogen fertilizers (SNFs), water-soluble fertilizers (WSFs), liquid NPKs, and chelated micronutrients, including boron, as specialty fertilizers.

A major challenge for the government is the rising cost of fertilizers

India's fertilizer major, IFFCO, has developed nano-fertilizer-grade urea and DAP, which are expected to revolutionize nitrogen fertilizer application. Nano urea, in liquid form, contains particles ranging from 20 to 50 nanometres. When sprayed on plant leaves, it is readily absorbed through the stomata and releases nitrogen inside the plant. Additionally, nano urea stimulates enzymes involved in nitrogen metabolism within plant cells. It is also expected to reduce the environmental footprint by minimizing nutrient loss from agricultural fields through leaching and gaseous emissions, which contribute to environmental pollution and climate change.

Energy transition

The consumption of plant nutrients per hectare of arable land in India remains lower than that of major agrarian countries. With urea consumption growing at an average rate of 2.6% in recent years and phosphatic fertilizer demand projected to grow at approximately 6% from 2024 to 2029, it is essential to rationalize usage to achieve an optimal soil nutrient balance. On average, an overall increase of 2–3% in fertilizer

consumption is expected in the near term, assuming normal monsoon conditions.

Increasing domestic fertilizer production is crucial, particularly in the context of the ongoing energy transition. Ammonia, a key fertilizer input, is also poised to become a fuel of the future for long-distance maritime transport. The government has announced the National Green Hydrogen Mission, which aims to position India as a global hub for green hydrogen and ammonia production. This energy linkage is expected to attract increased investment, particularly from the private sector.

In alignment with the country's energy transition goals and its commitment to achieving net-zero emissions by 2070, a large-scale initiative to decarbonize the fertilizer sector will be necessary. This will involve the incorporation of carbon capture and storage (CCS) technology and electrolyzers.

Additionally, commissioning new plants under construction and debottlenecking existing facilities with digital capabilities should be expedited to enhance production and efficiency.

Available low-grade rock phosphate deposits, such as those in Rajasthan, should be effectively utilized through advanced beneficiation techniques. Scientific fertilizer application is essential, not only to minimize wastage but also to prevent soil degradation and environmental pollution.

The government should implement a nationwide program to promote the use of compost, agricultural waste, green leaves, and farmyard manure as readily available sources of organic nutrients for crops.

For the marketing and distribution of fertilizers, emerging technologies—such as e-commerce platforms, digital marketing, and direct benefit transfer (DBT) systems—must be leveraged to improve efficiency, reduce losses, and eliminate delays.

Call for investments

The government, in collaboration with the scientific community, should explore alternatives to traditional fertilizers, such as organic, bio-based, and nano-based options, while promoting precision farming techniques to advance sustainable agriculture. This approach will also help mitigate disruptions in the supply chain of traditional fertilizers and raw materials, which frequently occur due to various factors.

The outlook for India's future fertilizer market, therefore, calls for increased investment in production, technological advancements for digitization and decarbonization, retrofitting and revamping existing units, and, most importantly, farmer empowerment. ■

Fertilizer transport routes across Asia

Written by

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Asia's agricultural sector, a cornerstone of its economy and food security, relies heavily on the efficient and equitable distribution of fertilizers. The complexity of fertilizer transport in Asia arises from its vast geographical diversity and the economic disparity among countries. The region comprises a wide range of terrains, from highlands rising several hundred meters above sea level to coastal tracts near mean sea level (MSL), each posing unique logistical challenges.

Countries with coastlines can comfortably exploit maritime routes, whereas landlocked regions largely depend on road and rail networks for fertilizer transport. Beyond transport routes, several factors significantly influence fertilizer logistics, including the availability of infrastructure for cost- and time-effective transport, minimal bureaucratic hindrances, effective bilateral collaborations with fertilizer-producing countries, and, above all, geopolitical stability.

Addressing these challenges is essential for enhancing fertilizer logistics and ensuring that all regions have the necessary resources to support their agricultural sectors effectively.

Several key producers play a crucial role in supplying essential nutrients for agricultural growth

Major fertilizer producers and consumers in Asia

In the global fertilizer market, several key producers play a crucial role in supplying essential nutrients for agricultural growth, particularly to agrarian economies. Among the major fertilizer-producing countries in Asia, China, India, and Indonesia play a significant role in the supply chain.

China is a leading producer, meeting its substantial domestic demand for nitrogen and phosphorus fertilizers while also exporting extensively to other Asian countries. However, it relies on imports for potash, with Russia being a critical supplier. Indonesia supports both its agricultural economy and that of neighbouring Southeast Asian countries.

Beyond Asia, Saudi Arabia and Russia are dominant global suppliers of fertilizers. Russia, in particular, serves as a major supplier to China, India, Vietnam, and Thailand, ensuring a steady supply of essential nutrients for crop production in regions dependent on these imports.

On the consumer side, agriculturally driven economies such as India, Bangladesh, Vietnam, and Nepal rely heavily on the availability of fertilizers to maintain and enhance agricultural productivity. These countries import substantial quantities to complement domestic production, focusing on food security and supporting their predominantly agrarian economies. Similarly, Pakistan and Thailand depend on both imports and domestic production to sustain their agricultural sectors.

Tables 1 and 2 highlight the region's interdependence, with certain countries serving as key producers

Several major ports manage significant volumes of fertilizers

Table 1. Fertilizer-producing countries and their supply to Asia

Fertilizer producing countries	Regular supplier to Asian countries
China	Extensive exports to various Asian countries, including India, Indonesia, and Vietnam
India	Supplies domestic needs and exports to neighbouring Asian countries like Bangladesh and Nepal
Indonesia	Supplies within Southeast Asia, including Malaysia and the Philippines
Saudi Arabia	Supplies mainly in the Gulf Cooperation Council (GCC) and broader Middle East
Russia	Significant supplier to China and other parts of Asia

while others rely significantly on imports to support their agricultural sectors.

The interplay between these producers and consumers underscores the critical role of fertilizer trade in sustaining global food production.

Current transport routes

Key fertilizer transport routes and logistical hubs across Asia are vital for ensuring efficient distribution. Maritime routes, particularly the Strait of Malacca, serve as crucial passages for fertilizer transit among Southeast Asian nations, linking major ports such as Singapore, Port Klang in Malaysia, and various Indonesian ports. Meanwhile, the South China Sea is essential for transporting fertilizers to countries such as China, South Korea, Japan, and Vietnam, connecting major producers in Southeast Asia.

Rail networks also play a significant role, with the Trans-Siberian Railway linking the Russian Far East to Europe, enabling Russia, a leading fertilizer producer, to supply markets in China and Mongolia. Additionally, the China-Europe Railway Express provides a reliable alternative to maritime transport, efficiently moving fertilizers from major Chinese cities, including Chongqing and Wuhan, to European destinations.

Road transport is facilitated by the extensive Asian Highway network, which spans from Japan to Turkey and is critical for land transport across countries such as India, Thailand, and Malaysia. In India, key highways such as NH44 and NH48 connect fertilizer manufacturing centres to rural agricultural areas, ensuring efficient distribution.

Several major ports manage significant volumes of fertilizers. The Port of Qingdao and the Port of Shanghai in China handle large quantities for both domestic use and export, while the Port of Tanjung Priok in Indonesia serves as a crucial entry and exit point for fertilizers in Southeast Asia, underscoring its importance to regional supply chains.

Inland waterways also contribute to efficient logistics. The Yangtze River in China facilitates fertilizer transportation from coastal manufacturing plants to inland agricultural regions, while the Mekong River supports internal distribution in Vietnam, Thailand, and Cambodia, benefiting farming communities along its course.

Efficient distribution

Fertilizer logistics in Asia is characterized by country-specific networks that leverage a combination of maritime routes, rail systems, and road networks to ensure efficient distribution to agricultural zones. Below are the key transport networks across major Asian countries:

China: Combining maritime routes, rail networks, and inland waterways, China efficiently manages its fertilizer logistics. Ports such as Qingdao, Tianjin, and Shanghai play a pivotal role in trade, while the extensive domestic rail system, including the China-Europe Railway Express, facilitates transportation both within the country and internationally.

India: India's agricultural sector heavily relies on fertilizers to enhance crop yields and ensure food

Table 2. Agrarian economy consumer countries and their dependence on fertilizer imports

Agrarian economy consumer countries	Dependence on fertilizer imports
India	Heavy reliance on both domestic production and imports from China, Russia, Canada, Jordan, Morocco, Indonesia, Saudi Arabia and UAE
Bangladesh	Imports largely from India and China for its intensive agriculture sector
Vietnam	As Vietnam supports a strong rice-producing sector, it imports extensively from China, Russia, Indonesia, Malaysia, Saudi Arabia and UAE
Nepal	Relies on imports from India for its agriculture needs
Pakistan	Imports from fertilizers from China, Saudi Arabia, UAE, Russia, Qatar to boost its agriculture output
Thailand	Imports from China, Russia, Indonesia, Saudi Arabia and India to support its large agricultural economy

Freight Train at Kedgaon, near Pune, India

security but remains dependent on imports due to domestic production shortfalls. In 2023-24, India imported 18.65 lakh tonnes of urea and 22.58 lakh tonnes of phosphatic and potassic (P&K) fertilizers from China. Additionally, the country is almost entirely reliant on imports for potash, sourcing it primarily from Canada, Russia, and Belarus, as it lacks significant domestic deposits. The Indian government mitigates this dependence through strategic imports and subsidies, ensuring accessibility for farmers.

The transport routes for these fertilizers, which are critical for timely delivery, vary based on fertilizer type and origin, relying heavily on the nation's infrastructure. Urea, for instance, is imported via maritime shipping from countries such as China, Oman, and Iran to major ports like Mumbai, Kandla, and Visakhapatnam. It is then distributed inland via rail and road networks, with rail transport being the more cost-effective option for bulk shipments. Similarly, Di-ammonium Phosphate (DAP) arrives by sea and is distributed using a combination of rail and trucks, while Muriate of Potash (MOP) follows the same logistics pattern. Phosphoric acid and rock phosphate are also imported by sea and transported to manufacturing facilities for processing into final products.

India's internal fertilizer distribution relies heavily on its extensive rail and road networks. Major production hubs, such as Gujarat and Maharashtra, are well-connected to agricultural regions through a comprehensive railway system, while critical highways enable efficient land transport. Ports like Kandla and Mumbai are fundamental to handling imports, and inland waterways further support logistical operations.

Indonesia: As an archipelagic nation, Indonesia prioritizes maritime transport. The Port of Tanjung Priok is crucial for fertilizer imports, with significant inter-island shipping routes ensuring wide distribution across its numerous islands.

Japan: Japan's agricultural land accounts for approximately 12-13% of its total land area, covering around 4.5 million hectares (11 million acres), with rice being the primary crop. Despite its relatively small agricultural sector, Japan relies on substantial fertilizer supplies to maximize crop yields and address soil quality challenges. The demand for fertilizers is crucial for maintaining high productivity and ensuring food security, leading to significant imports

Fertilizer transport in Asia faces significant logistical and economic challenges

of nitrogen, phosphate, and potash fertilizers to support its intensive farming practices.

Japan primarily imports fertilizers from various countries, sourcing nitrogen fertilizers such as urea from China and Russia, phosphate fertilizers from Morocco and the United States, and potash from Canada and Russia. Additionally, the country acquires raw materials from Southeast Asia, Australia, and the Middle East to sustain its agricultural sector, ensuring stable access through coordinated efforts by the government and agricultural stakeholders. Given its limited domestic fertilizer production, maritime routes play a key role in Japan's logistics. Ports such as Yokohama and Kobe serve as primary entry points, supported by a sophisticated rail and road infrastructure for nationwide distribution.

Thailand: Utilizing both inland waterways, such as the Chao Phraya River, and national highways, Thailand efficiently connects major ports with agricultural zones, ensuring timely fertilizer delivery.

Vietnam: The vast river networks of the Mekong Delta are complemented by extensive highways, with key ports such as Ho Chi Minh City playing a central role in coordinating import and export activities.

Russia (Asian Context): The extensive rail network, particularly the Trans-Siberian Railway, facilitates fertilizer movement to Asian markets such as China and Mongolia, while Far Eastern ports play a significant role in international shipments.

Malaysia: With Port Klang as the central hub for imports, Malaysia distributes fertilizers through a comprehensive road network, ensuring adequate supply to agricultural regions.

Bangladesh and Pakistan: Bangladesh leverages its river systems for local fertilizer transportation, with the Port of Chittagong serving as a vital import hub. In Pakistan, an extensive road network, supported by Karachi Port, ensures efficient fertilizer distribution across vast agricultural areas.

Challenges and regulatory issues

Fertilizer transport in Asia faces significant logistical and economic challenges that impact efficiency and reliability. Infrastructure limitations, such as poorly maintained roads, restricted rail networks, and inadequate port facilities—especially in rural regions—hinder efficient transportation. The continent's diverse geography, including mountain ranges, dense forests, and expansive deserts, adds complexity to logistics, requiring specialized solutions. For instance, in the Philippines, Typhoon Haiyan in 2013 disrupted supply chains, causing severe delays in fertilizer deliveries to affected agricultural regions. Similarly, India's monsoons often result in flooding that obstructs essential transport routes, increasing delivery times and costs for farmers. Urban congestion in major cities such as Jakarta, Manila, Mumbai, Dhaka, Karachi, Bangkok, and Hanoi further exacerbates these issues, slowing the movement of goods and creating inefficiencies in last-mile delivery.

Economically, fluctuating fuel prices and rising labour costs challenge the feasibility of long-distance transport, while variations in regional demand and purchasing power can lead to uneven distribution, resulting in surpluses in some areas and shortages in others. Currency fluctuations also impact pricing, affecting the competitiveness of exports and imports, as well as overall market stability and profitability.

Moreover, regulatory issues significantly complicate fertilizer transport, with lengthy customs procedures often causing delays in cross-border shipments. Compliance with varying national and international safety and environmental regulations presents additional challenges, particularly regarding the handling of hazardous materials. Trade barriers, such as tariffs and quotas, further hinder international fertilizer trade, while differing documentation requirements across countries can create bottlenecks if not meticulously managed. These challenges ultimately impede the smooth transportation and distribution of fertilizers throughout the region.

Addressing these issues requires targeted strategies to enhance supply chain efficiency and ensure the timely delivery of essential agricultural inputs.

Opportunities for improvement in fertilizer transport routes in Asia

Amid ongoing conflicts and rising geopolitical tensions, ensuring a stable fertilizer supply is critical for food security across Asia and the world. As nations increase defense budgets, investment in transportation infrastructure—such as roads, railways, and ports, particularly in rural areas—becomes essential for enhancing logistics efficiency. Public-private partnerships can help mobilize resources for these projects, while digital technologies and automation can further address logistical challenges. Advanced tracking systems and data analytics can optimize route planning, while IoT devices enable real-time monitoring

of transport conditions—an essential capability in uncertain environments.

Cross-border cooperation is crucial for overcoming trade barriers heightened by current tensions. Governments should harmonize customs procedures and simplify documentation to minimize delays, while bilateral agreements on tariffs and quotas can facilitate smoother trade. Establishing regional regulatory frameworks that align safety and environmental standards will also ease compliance issues. These strategies are vital for navigating the significant challenges posed by the current global landscape and ensuring long-term food security.

Cross-border cooperation is crucial for overcoming trade barriers heightened by current tensions

Implications of ongoing conflicts on fertilizer transport routes

The ongoing conflicts in Ukraine and the Middle East have significantly disrupted fertilizer transport routes in Asia, leading to supply chain challenges and rising costs. The war between Russia and Ukraine has forced major potash suppliers, such as Russia and Belarus, to redirect their exports toward Asia and South America due to Western sanctions. This shift has nearly restored global potash supplies to pre-war levels, prompting producers to reduce output to prevent oversupply. Additionally, the suspension of the Black Sea Grain Initiative in July 2023 has hindered Ukraine's ability to export agricultural products, including fertilizers, affecting supply routes to Asia.

Compounding these issues, conflicts in the Middle East have further complicated logistics. Houthi rebel attacks in the Red Sea have forced ships to reroute around the Cape of Good Hope, adding approximately 15 days to shipment times and significantly increasing freight costs. This detour particularly impacts the import of muriate of potash (MOP) from Jordan and Israel to countries such as India. Geopolitical tensions have also driven substantial increases in global shipping costs, with container rates rising 2.5 to 3 times higher than in early December 2023 and spot rates for vessels transiting the Suez Canal surging nearly fivefold.

These disruptions pose serious risks to Asian nations reliant on Middle Eastern fertilizer imports, potentially jeopardizing domestic agriculture and leading to inflation in agricultural products, thereby threatening food security in the region. The Russia-Ukraine conflict has prompted a re-evaluation of global fertilizer supply chains, driving diversification of import sources, market adjustments, and policy interventions aimed at maintaining agricultural stability.

Global supply disruptions and realignments

Russia and Belarus are significant suppliers of key fertilizers, including potash, nitrogen, and phosphorus. The ongoing conflict and resulting Western sanctions have disrupted their exports, forcing importing nations to seek alternative sources. For example, India, which has traditionally relied on Russia and Belarus for a significant portion of its potash, has increased its purchases from countries such as Canada, Israel, and Jordan to ensure adequate supplies for its agricultural sector.

Initially, these disruptions led to a surge in global fertilizer prices. However, as Russia and Belarus adapted by redirecting exports to regions including Asia and South America, global potash supply began approaching pre-conflict levels. This resurgence, along with increased production from other countries, has contributed to price stabilization. Major producers, such as Canada's Nutrien, have even curtailed their output to prevent market oversupply.

In response to changing trade dynamics, regions such as the European Union have implemented protective measures. The EU has proposed new tariffs on agricultural products and nitrogen-based fertilizers imported from Russia and Belarus. These tariffs aim to reduce dependency on Russian imports, safeguard EU food security, and limit revenue streams that could support Moscow's activities in Ukraine.

Implications for India

For India, the conflict has underscored the necessity of diversifying fertilizer import sources. The Indian government has proactively increased imports from alternative suppliers and allocated substantial subsidies to shield farmers from global price fluctuations. In the fiscal year 2022-23, a record INR2.25 lakh crore was designated for fertilizer subsidies, ensuring that domestic agriculture remains resilient amidst global supply challenges.

Efficient fertilizer transport in Asia plays a crucial role in ensuring food security, particularly because most Asian countries have agrarian economies and are more densely populated than other regions. However, diverse geography, economic disparities, and geopolitical instability in many Asian nations pose serious challenges to supply networks, including fertilizers. Therefore, modernizing infrastructure, adopting digital logistics, and fostering cross-border cooperation are essential to overcoming these obstacles and ensuring the timely, affordable delivery of fertilizers to support a more resilient agricultural sector in Asia. ■

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Outlook: China's sulphur market

Written by **Huang Minglei,** *Sulphur-Sulphuric Acid-Copper Researcher,*
Chisage Energy and Chemical CO., LTD. Zhejiang Province, China

In 2024, the price of sulphur in China saw significant growth after a six-month period of stagnation. The price of sulphur surged from RMB900/t to RMB1600/t by the end of 2024, reflecting a staggering increase of 75%. The fundamental reason for the rise in sulphur prices in China is the rapid growth in demand for sulphur from the new energy industry both domestically and internationally, as well as the delay in new sulphur production capacities. There is still significant uncertainty in the pattern of China's sulphur market in 2025, and whether the marginal supply can continue to transform and whether downstream demand side profits can be restored will determine where the market will go.

Underperformance of new overseas supply

In 2024, China imported 9.95 mn t of sulphur, with a reliance on overseas supply reaching as high as 47.1%. Sulphur imports were primarily sourced from the Middle East (excluding Iran), which contributed approximately 4.6 mn t, Canada, which accounted for around 1.5 mn t, and other regions in Eastern Asia and beyond. The shift towards new energy replacing traditional energy sources has led the major sulphur-supplying countries in the Middle East to slow down development of oil and gas fields, thereby delaying the commissioning of new desulphurization facilities. Notable examples include the Hail and Ghasha high-sulphur gas fields in the United Arab Emirates.

While Canada boasts a substantial sulphur inventory of nearly 12 mn t in Alberta, much of it is safeguarded from the early 21st century, the conversion of this inventory into effective supply remains constrained by logistical and environmental challenges, even amid rising sulphur prices. Consequently, Canada's sulphur exports to China have grown steadily but not significantly beyond expectations. However, if sulphur prices remain stable at elevated levels, Canada's sulphur inventory conversion efficiency may accelerate. In 2025, global sulphur supply is expected to remain tight, with new production capacity concentrated in oil refineries in the middle east and Eastern Asia. Notably, sizable commissioning of high-sulphur gas fields is not anticipated during this period. The large-scale production capacity of sulphur is mainly concentrated in 2026 and 2027, and the current marginal supply increment mainly comes from the sulphur inventory converted under high prices, such as sulphur inventory from Turkmenistan and Venezuela.

Shortage of copper raw materials

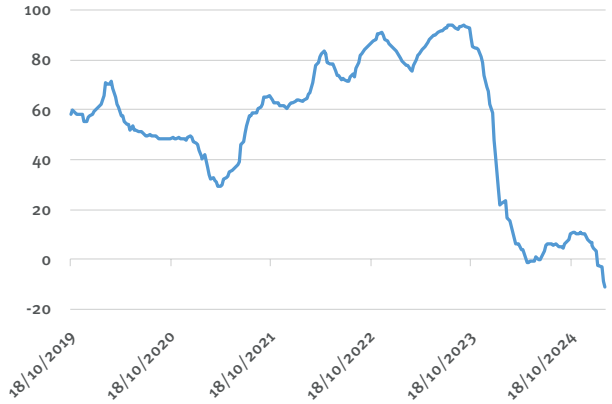
In March 2023, the Cobre Panama copper mine belonging to First Quantum in Panama was embroiled in a legal dispute and was declared to have violated the Panamanian Constitution and shut down in November of the same year. During the same period, Anglo American Resources also lowered their copper concentrate production in 2024 due to the decline in mining grade. This has led to a sharp drop in spot smelting and processing fees for copper concentrates from overseas. The extremely low copper concentrate smelting and processing fees have caused smelting enterprises that were supposed to start production in 2024 to postpone their production time in order to reduce production losses. At the same time, the strengthening of the price difference between refined copper and scrap copper has led smelting enterprises to seek more recycled copper raw materials overseas to produce crude copper, thereby reducing their dependence on copper concentrate. This has led to lower-than-expected crude copper production in China's mineral industry in 2024, resulting in lower-than-expected growth in the production of by-product sulphuric acid. Copper smelters have a stronger demand for premium sales of sulphuric acid due to extremely low processing fees and insufficient sulphuric acid production. As of the end of 2024, the price of sulphuric acid in major regions of China has increased by 150-200% compared with the beginning of 2024. In 2024, the price of sulphuric acid will take priority over the rise in sulphur prices, ultimately leading to an increase in the procurement of solid sulphur from ports by enterprises that have a substitute demand for sulphuric acid and smelting acid, further accelerating the clearance of port inventory. The spot processing fee for copper concentrate in 2025 is even more pessimistic. Currently, the spot processing fee has reached negative numbers, and the vast majority of small smelters have shut down and reduced production. At the same time, the market expects that in the upcoming second quarter, copper smelters will extend maintenance time or increase maintenance capacity to some extent on their original maintenance plans, in order to compete with the processing costs proposed by the mine. However, for the whole year, the situation of smelting acid will still remain tight, and the newly added smelting capacity will continue to be delayed, which will result in a greater shortage of sulphuric acid in alternative supply.

Rapid growth in mineral washing industries in Congo and Indonesia

The tightening of overseas sulphur supply is further exacerbated by the emergence of new demand centres in Indonesia and Congo. Indonesia, which imposed a ban on nickel ore exports starting in 2017 to strengthen

Figure 1. Solid sulphur price (RMB/t Zhenjiang Port)

Figure 2. China import copper concentrate index (USD/t)



its domestic nickel value chain, saw a surge in sulphur demand as Chinese companies such as Castle Peak Holdings Group continued to establish factories in the country, producing Mixed Hydroxide Precipitate (MHP) from 2023 onwards. Compared with 2022, Indonesia's sulphur imports increased by approximately 2 mn t in 2024. Similarly, the wet-method copper refining projects in Congo, spearheaded by Chinese enterprises such as CMOC, have driven an additional 1.5 mn t increase in sulphur imports over the past two years. Plans to expand refining capacity further in 2025 suggest continued demand growth.

Meanwhile, OCP, a global leader in fertilizer production, has expanded its phosphate fertilizer capacity to nearly 15 mn t, further straining sulphur imports from the Middle East. Due to the advantageous location of emerging markets in utilizing mineral resources and the ability to enhance their added value by building a complete industrial chain, they have a higher acceptance of sulphur prices, making it more difficult for China to obtain cheap sulphur. This situation may continue until 2025, but the production cycle of wet copper projects seems to be nearing its end, while the production of wet nickel will become increasingly uncertain as profits narrow. However, in the case of a shortage of new supply, the carryover demand from the previous year will still squeeze a large part of the sulphur supply that originally belonged to China.

Growth in fine phosphorus chemical industry

Prior to 2024, sulphur consumption in China was predominantly driven by phosphate fertilizer and titanium dioxide production. Despite the Chinese government's efforts to address phosphate fertilizer overcapacity through supply-side structural reforms initiated in 2016, phosphate fertilizer production still accounts for approximately 45% of total sulphur consumption. In recent years, the government has prioritized the upgrading of the domestic phosphorus industry, encouraging phosphate fertilizer manufacturers to diversify into the production of fine phosphorus chemicals. Furthermore, local governments have incentivized technological innovation by allocating phosphorus mines to new energy enterprises, particularly those focused on lithium iron phosphate battery technology, to enhance value addition along the supply chain.

The commissioning of new battery manufacturing facilities in 2024 and 2025 has led to a notable increase in sulphur demand for the production of refined phosphate, with estimates suggesting that the new energy battery sector contributed approximately 1.3 mn t of incremental sulphur demand in 2024. This trend is projected to continue in 2025, with an expected growth of around 1 mn t. However, rapid capacity expansion in the battery industry has eroded profit margins, with approximately 70% of companies hovering near the break-even point. The profits of the new energy industry chain are mainly concentrated in the mineral resources end and the finished battery end, and the profits of the intermediate raw material processing end are severely compressed, which has caused many new energy enterprises that will be put into operation in 2024 to postpone production plans or reduce production loads. Whether the profits of new energy batteries can be redistributed in 2025 will determine whether the sustainability of the increased demand can be maintained, and this remains to be observed.

Although new demand sectors show promise, China's sulphur consumption remains heavily reliant on phosphate fertilizer production. Notably, China imposed an export ban on phosphate fertilizers beginning in November 2024, and as of February 2025, there was still no clarity on whether export restrictions would be lifted or how export quotas might evolve. While the industry widely anticipates eventual export resumption, uncertainties surrounding the timing and volume of exports persist. If the export restrictions remain in place, 2025's phosphate fertilizer market could mirror the challenges faced by urea exports in 2024.

Therefore, the uncertainty surrounding the Chinese sulphur market in 2025 remains - it is still difficult for the price of Chinese sulphur to reach RMB4000/t again as it did in 2022. However, as a resource product, sulphur is affected by its passive supply characteristics, and the sensitivity of sulphur prices to inventory is extremely high. Therefore, it is particularly important to be vigilant about the marginal increase of sulphur at high prices. ■

People and events

Danakali appoints Non-Executive Director

Danakali Limited advises that Ms Chinekwu Duru has been appointed as a Non-Executive Director of the Company. Ms Duru has been appointed to the Board as the nominee of substantial shareholder Africa Finance Corporation (AFC), following the recent resignation of Mr Taiwo Adeniji.

Ms Duru is a transactional lawyer with over 18 years of experience in infrastructure financing across various sectors (Natural Resources (Critical Minerals & Energy Resources), Transport (Port & Logistics), Heavy Industries and telecoms, Power, Project Development, Sovereign Lending, Debt Capital Markets (Funding, and OTC Derivatives), Financial Advisory, Syndications and Trade Finance transactions. Ms Duru is Senior Vice President & Lead Counsel at AFC.

Danakali's Executive Chairman, Seamus Cornelius commented: "Chinekwu brings extensive transactional and corporate governance experience to Danakali and will enhance the Board's broad range of skills, experience and diversity. We value our strong relationship with AFC and welcome Chinekwu Duru to the Board."

This announcement has been authorised by Seamus Cornelius, Executive Chair of Danakali Limited

Dr. Suresh Kumar Chaudhari appointed as Director General of The Fertiliser Association of India

Dr. Suresh Kumar Chaudhari has taken over as the Director General of The Fertiliser Association of India (FAI), New Delhi. Dr. Chaudhari previously served the Indian Council of Agricultural Research (ICAR) in various capacities. From January 2020 to January 2025, he held the position of Deputy Director General (Natural Resource Management).

In recognition of his pioneering work in the field of agriculture, Dr. Chaudhari has received numerous national and international honours and awards.

Deepak Fertilisers and Petrochemicals Corporation Limited appoints Prikshit Agarwal as President-Strategy

Deepak Fertilisers and Petrochemicals Corporation Limited has announced the appointment of Mr. Prikshit Agarwal as President-Strategy of the company with effect from 24 February, 2025. Mr. Agarwal has done his Master of Business Administration from Saïd Business School, University of Oxford, PG Diploma in Management from Indian Institute of Management (IIM) Kozhikode and Bachelor of Science (Physics) from the University of Delhi. Mr. Agrawal has worked with multinational as well as Indian companies and brings with him rich experience in the fields of corporate strategy, business development, mergers and acquisitions, solving complex problems, facilitation of long-term Strategy, strategic due diligence, supply chain, investment strategy and commercialization strategy.

Trump appoints chairman for US rail regulator

President Donald Trump has appointed Patrick Fuchs (R) to be chairman of the US Surface Transportation Board (STB), an independent federal agency that oversees rail rates and regulations.

Fuchs has been a board member since January 2019. His second, five-year term expires on 14 January 2029. The Association of American Railroads (AAR) said it looked forward to working with Fuchs.

Fuchs is a "thoughtful, solutions-oriented leader who lets data drive the decision-making process", AAR chief executive Ian Jefferies said.

Fuchs replaces Robert Primus (D), who was named chairman by former president Joe Biden on 11 May 2024 following the retirement of former chair Martin Oberman. The board has been a member short since Oberman's retirement last year. A replacement has not been named.

Fuchs previously served as the senior staff member on the US Senate's Commerce, Science and Transportation Committee when US Senate majority leader John Thune (R-South Dakota) was chairman.

Fuchs takes control shortly after STB has ruled on one of its longest running cases. The agency last week ruled in a nearly decade-old case about fees charged by Union Pacific to move empty, privately owned tank cars to repair facilities. UP was ordered to not charge such fees unless it can show car providers have been reimbursed for those expenses. Shippers are trade groups are already considering an appeal. Several other rulemakings remain. Shippers continue to watch closely for action on a proposal to adopt regulations governing railroads' use of private freight cars. Shippers hope to charge carriers a fee similar to the demurrage billed by railroads.

Also still unresolved is a proposal to regulate rail transportation of iron or steel products or scrap, coke from coal, crushed stone and hydraulic cement. ■

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Daily Fertilizer Price Assessments

Nitrogen

- **Prilled:**
  - China fob
- **Granular:**
  - Egypt fob
  - Brazil cfr
  - Nola (US Gulf) fob $/st

Ammonia

- East Asia cfr *(excluding Taiwan)*
- Middle East fob

Phosphates

- DAP fob China
- DAP cfr India
- MAP cfr Brazil
- DAP barges fob Nola
- MAP barges fob Nola

Sulphur

- China cfr granular $/t
- China domestic (ex works) Yn/t

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Argus daily price assessments provide you with unique benefits, including

Greater certainty

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Lower risk

Additional data points ensure your business calculations are more robust.

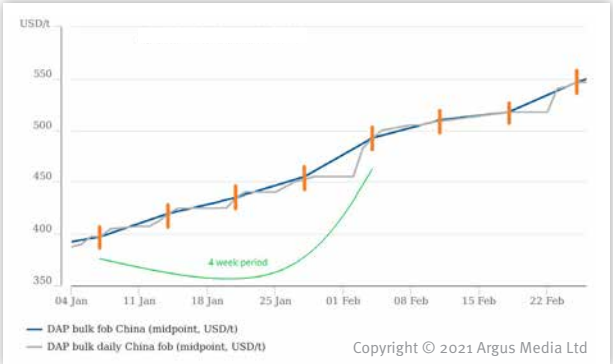
Smarter outcomes

Daily data powers the most sophisticated data analysis and algorithmic trading tools.

Increased confidence

Access editorial staff in key global fertilizer hubs: Widest geographical reach and rigorous methodological adherence.

Sharp price action captured earlier with daily assessment



Over the highlighted 4 week period (7 Jan to 4 Feb 2021) the price of DAP fob China grew from $397.50/t to $492.50/t, an increase of 24%. The blue line on the graph, marked by the 5 weekly prices over this period (orange) clearly highlights this price growth. However, the 21 daily prices over this same period (grey line) provide greater detail on how this price growth was achieved.

For more information please contact us: fertilizer-m@argusmedia.com www.argusmedia.com/fertilizer

Fertilizer
illuminating the markets

Market Reporting
Consulting
Events

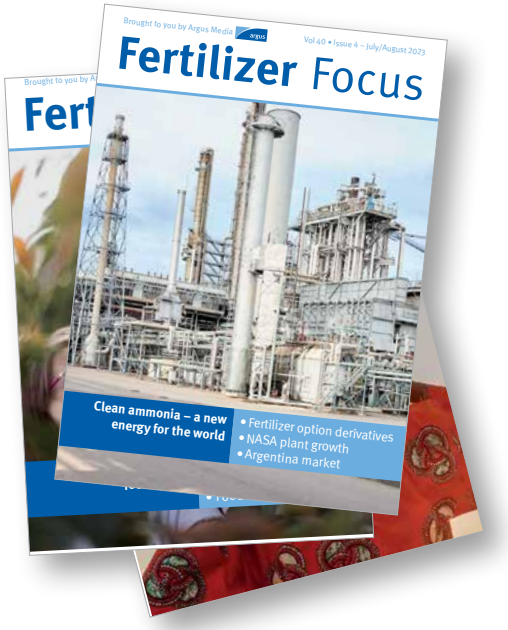
Fertilizer Focus

Media pack 2025

Fertilizer Focus heritage

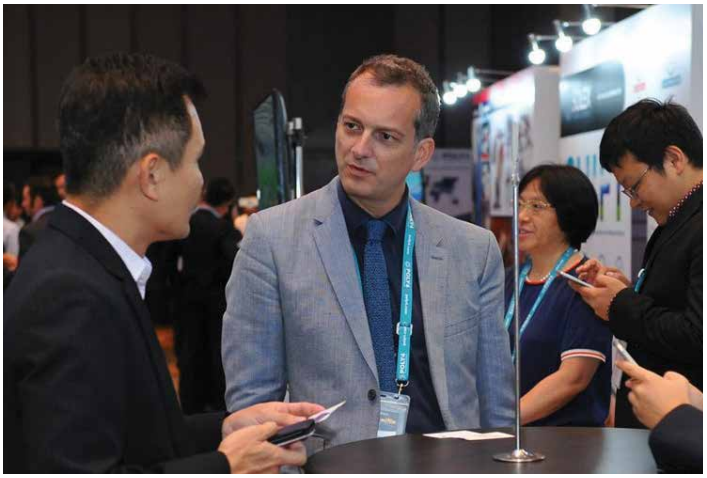
Argus produces the most comprehensive suite of pricing and market intelligence services available to the fertilizer industry

First published in February 1984 by FMB Consultants, Argus' Fertilizer Focus is the world's leading bi-monthly journal serving the international fertilizer industry. It covers the key developments influencing fertilizer and related markets, such as production economics, technology, plant and project news, and product logistics.



Drawing on Argus's unrivalled expertise and wealth of contacts from our market reporting, consulting and conferences, the editorial content in Fertilizer Focus covers the issues which are top-of-mind for senior executives in the industry. As an advertiser, your message reaches decision makers throughout the world and positions you as a thought-leader on the cutting edge topics which will define the future of the industry. The magazine features a unique blend of news, features, interviews and analysis of all aspects of the fertilizer industry, including:

- Spotlight on hot new trends and growth areas - including clean ammonia and low carbon/ sustainable fertilizers
- New product developments – fertilizer blends, enhanced efficiency ingredients, micronutrients, liquid fertilizers
- Fertilizer production technology across all products
- Port logistics and shipping
- Company strategy, industry developments and emerging markets
- Agronomic analysis and changes in agricultural practice impacting fertilizers



Editorial schedule

January/February issue

Advertising due date - **6 December 2024**

Special Focus - INFRASTRUCTURE AND LOGISTICS

- Overview of new facilities
- Risk accessing shipping markets
- Traceability and certification

SUPPLEMENT - AFRICA

- The African Fertilizer Financing Mechanism
- Regional Hub for Fertilizer and Soil Health in West Africa and the Sahel
- Integrating Africa through technology

March/April issue

Advertising due date - **14 February 2025**

Special Focus - LOW CARBON FERTILIZERS

- Adapting fertilizer production for decarbonisation
- Low carbon nitrogen processes
- Next generation enhanced efficiency fertilizers

SUPPLEMENT - ASIA

- The Asian sulphur markets
- Future growth in India
- Key transport routes

May/June issue

Advertising due date - **11 April 2025**

Special Focus - PRODUCTION TECHNOLOGY

- Innovations in water soluble fertilizers
- Case study: Updating production plants
- Modularisation of potash production

SUPPLEMENT - LATIN AMERICA

- Trends in Brazil's import markets
- Production facilities in Latin America
- Key crops and nutrient requirements

July/August issue

Advertising due date - **13 June 2025**

Special Focus - CLEAN AMMONIA

- Clean ammonia for agricultural uses
- Hydrogen transport and infrastructure
- Case study: Blue ammonia

SUPPLEMENT - MIDDLE-EAST

- Impact on fertilizers from Middle-East conflicts
- GCC investments
- Regional innovative technologies

September/October issue

Advertising due date - **11 August 2025**

Special Focus - FERTILIZER SUSTAINABILITY

- Soil health and balancing carbon emissions
- Balancing food security with sustainability
- Greener SOP production

SUPPLEMENT - EUROPE

- Sulphur demand and supply in Europe
- CBAM update
- Sustainable nutrients market in Europe

November/December issue

Advertising due date - **10 October 2025**

Special Focus - THE FERTILIZER ECONOMY

- The impact of geopolitics and trade legislation
- The changing landscape of US phosphate import duties on Morocco
- Fertilizer price volatility outlook

SUPPLEMENT - NORTH AMERICA

- One year on: US election and the impact on agriculture
- Mexican fertilizer transport routes
- Canadian import market trends

Distribution

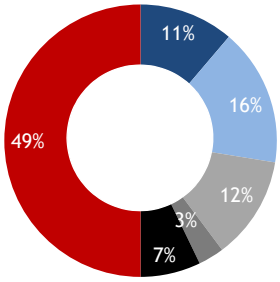
Sector leading digital and hard copy distribution

Published six times a year, the magazine is read by subscribers in over 90 countries. Fertilizer Focus has a unique, best in class distribution, benefiting from Argus' unrivaled presence in the fertilizer sector - **the digital circulation of the magazine in late 2024 was nearly 15,000 - and is growing substantially each month.** Around two thirds of our digital recipients are paying subscribers of Argus fertilizer price reporting and outlook services. This encompasses executives and decision makers in all of the major fertilizer producers, traders, importers and buyers, as well as sector focused financial institutions, shippers, engineering companies, plant contractors, government agencies and trade associations. Our key magazine features are promoted on leading social media platforms (LinkedIn, Twitter, Facebook)

Reader profile

Our unique and unrivaled circulation means your messages reach the industry's most important decision makers.

% of all Fertilizer Focus recipients with the following in their job title



- Executive, President, Director, Vice President
- Manager, Head, Consultant, Advisor
- Sales, Commercial, Marketing, Supply
- Procurement, Buyer, Purchaser, Sourcing, Business Development
- Analyst, Intelligence, Strategy, Accountant, Finance, Investor Relations, Economics
- Other

Unique event distribution

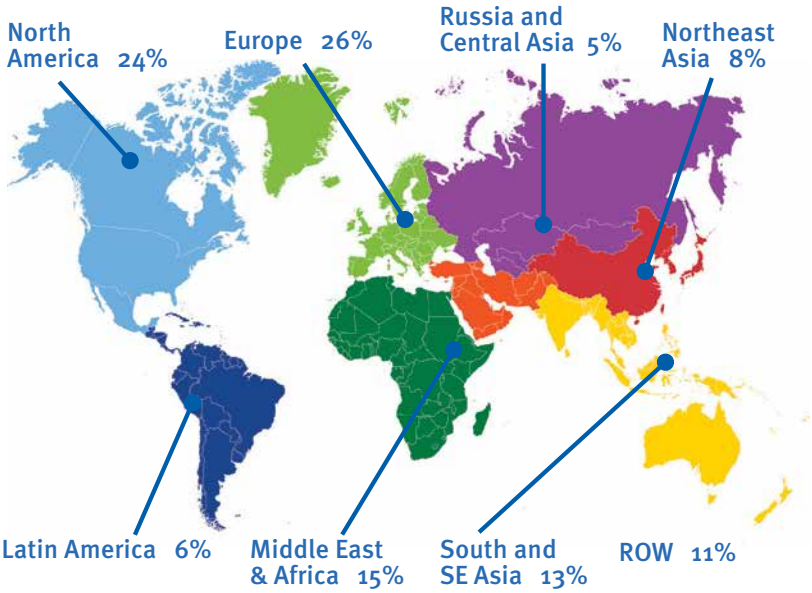
Fertilizer Focus is distributed to every one of the thousands of delegates attending Argus' fertilizer conferences around the world, and available at all of the major global and regional industry events.

Fertilizer Focus will continue to give you unrivaled events positioning. The pandemic temporarily restricted the ability of Argus and other events organizers to deliver physical events, but this is changing. Argus' industry leading conferences are returning in their traditional physical format and our magazine will be delivered to registrants at both physical and digital conferences.

Global distribution breakdown

Our geographic distribution is aligned with the broader Argus fertilizer customer base.

Regional distribution of Fertilizer Focus recipients



Argus events

- Fertilizer Latino Americano (FLA)
- Argus Asia Fertilizer
- Argus East Europe Fertilizer
- Argus Europe Fertilizer
- Argus Clean Ammonia
- Argus Vehicle Emissions and DEF Summit USA
- Argus Paris Grain Conference
- Argus Green Marine Fuels Conference

Global and regional industry events

- AFA Annual Fertilizer Forum & Exhibition, Egypt
- FAI Annual Seminar, India
- IFA Annual Conference
- IFA Crossroads
- Southwest Fertilizer, USA
- TFI Annual Meeting, USA
- TFI World Fertilizer, USA

Advertising rates 2025

Cover rates	
	USD
Outside front package	6,000
Inside front cover	3,740
Inside back cover	3,530
Outside back cover	4,080

Run of press rates	1 Issue	2 Issues (10% discount)	3 -5 Issues (20% discount)	6 Issues (30% discount)
	USD	USD	USD	USD
Double page	6,460	5,748	5,100	4,464
Full page	3,120	2,808	2,496	2,184
Half page	2,640	2,376	2,112	1,848
Third page	1,860	1,674	1,488	1,302
Quarter page	1,740	1,566	1,392	1,218

For more details or to discuss our requirements please contact Stefan Worsley: stefan.worsley@argusmedia.com

Advertising specifications

Editorial & advertising schedule 2025	
Edition	**Due date**
January/February	6 December
March/April	14 February
Maj/June	11 April
July/August	13 June
September/October	11 August
November/December	10 October

SIZE & POSITION

Once you have booked your advertisement please ensure you supply the artwork at the correct size, as below. Please note: 'Trim size' is the actual size that the advertisement will appear in the publication. 'Bleed size' is the size your advertisement needs to be supplied to us including the required 3mm bleed (if full page). 'Type area' is the suggested area that any text or important information should sit within to ensure details have some clear space around them for clarity.

TECHNICAL SPECIFICATION

Please ensure your advertisement is produced professionally, and in accordance with the following criteria:

- All artwork should be CMYK colour (No Pantone/Spot colours)
- All fonts should be embedded or outlined
- All images within the artwork must be at least 300dpi resolution and in CMYK colour
- For Full Page adverts please include 3mm bleed and crop marks

FILE FORMAT & SUPPLY

Our preferred file type is a high resolution PDF to the the following specification when exported from Adobe InDesign:

- Adobe PDF Preset: PDF/X-4:2008
- Colour Profile: Coated FOGRA39 (ISO 12647-2:2004)

The above will ensure your advertisement appears in the best possible quality, however if you are unable to supply as a PDF we will accept a 300dpi JPEG or TIFF file in CMYK colour format.

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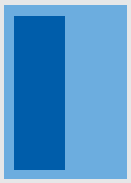

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THIRD PAGE (Horizontal)

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Type area:
54mm(h) x 172mm(w)

THIRD PAGE (Vertical)

Trim size:
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Please note: Bleed is not required for Half Page and Third Page advertisements as these formats sit within the page, however we do recommend your advertisement includes a keyline/border if it has a white background.

If you have any queries regarding our specifications or to send us your files, please contact: Kate.Shanley@argusmedia.com

Fertilizer Focus

For advertising and editorial information please contact:
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Fertilizer Focus

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SPECIAL FOCUS: PRODUCTION TECHNOLOGY

- Innovations in water soluble fertilizers
- Case study: Updating production plants
- Modularisation of potash production

SUPPLEMENT: LATIN AMERICA

- Trends in Brazil's import markets
- Production facilities in Latin America
- Key crops and nutrient requirements

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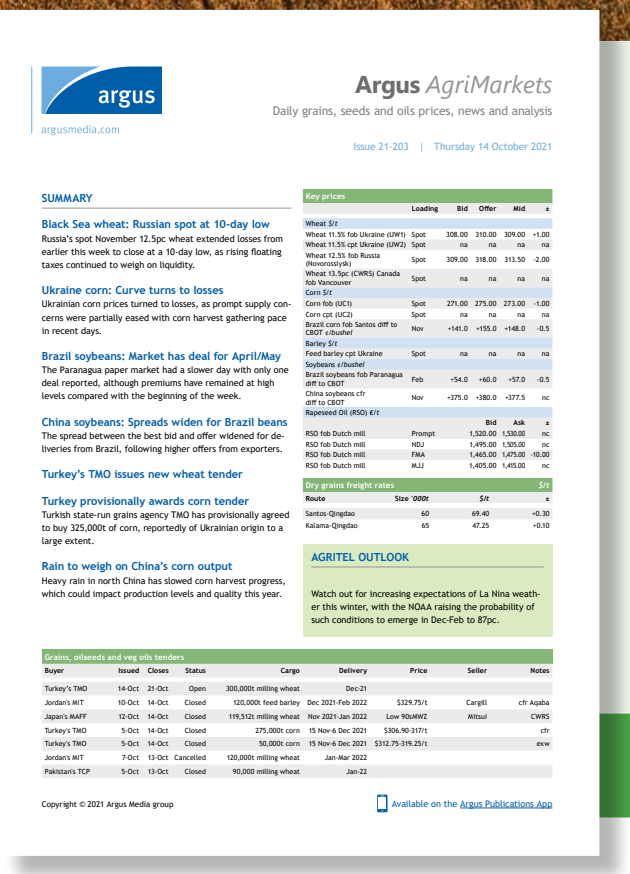
Timely, accurate and dependable price assessments, news and analysis for the agriculture markets

Key features of Argus Agrimarkets:

- **Executive summary**
- **Current and historical prices**
- **Grains, oilseeds and veg oils tenders**
- **Black Sea market - news, insight, current and forward prices**
  - Ukraine wheat market
  - Ukraine corn market
  - Ukraine Barley Market
  - Russia wheat market (spot prices only)
- **Brazil soybean and corn - news, insights and prices**
- **China soybeans market**
- **Global news and key market developments**



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Daily grains, seeds and oils prices, news and analysis

Issue 21-203 | Thursday 14 October 2021

SUMMARY

Black Sea wheat: Russian spot at 10-day low
Russia's spot November 12.5pc wheat extended losses from earlier this week to close at a 10-day low, as rising floating taxes continued to weigh on liquidity.

Ukraine corn: Curve turns to losses
Ukrainian corn prices turned to losses, as prompt supply concerns were partially eased with corn harvest gathering pace in recent days.

Brazil soybeans: Market has deal for April/May
The Paranagua paper market had a slower day with only one deal reported, although premiums have remained at high levels compared with the beginning of the week.

China soybeans: Spreads widen for Brazil beans
The spread between the best bid and offer widened for deliveries from Brazil, following higher offers from exporters.

Turkey's TMO issues new wheat tender

Turkey provisionally awards corn tender
Turkish state-run grains agency TMO has provisionally agreed to buy 325,000t of corn, reportedly of Ukrainian origin to a large extent.

Rain to weigh on China's corn output
Heavy rain in north China has slowed corn harvest progress, which could impact production levels and quality this year.

Key prices

	Loading	Bid	Offer	Mid	±
Wheat $/t					
Wheat 11.5% fob Ukraine (UW1)	Spot	308.00	310.00	309.00	+1.00
Wheat 11.5% cpt Ukraine (UW2)	Spot	na	na	na	na
Wheat 12.5% fob Russia (Novorossiysk)	Spot	309.00	318.00	313.50	-2.00
Wheat 13.5pc (CWRS) Canada fob Vancouver	Spot	na	na	na	na
Corn $/t					
Corn fob (UC1)	Spot	271.00	275.00	273.00	-1.00
Corn cpt (UC2)	Spot	na	na	na	na
Brazil corn fob Santos diff to CBOT ¢/bushel	Nov	+141.0	+155.0	+148.0	-0.5
Barley $/t					
Feed barley cpt Ukraine	Spot	na	na	na	na
Soybeans ¢/bushel					
Brazil soybeans fob Paranagua diff to CBOT	Feb	+54.0	+60.0	+57.0	-0.5
China soybeans cfr diff to CBOT	Nov	+375.0	+380.0	+377.5	nc
Rapeseed Oil (RSO) €/t					
			Bid	Ask	±
RSO fob Dutch mill	Prompt		1,520.00	1,530.00	nc
RSO fob Dutch mill	NDJ		1,495.00	1,505.00	nc
RSO fob Dutch mill	FMA		1,465.00	1,475.00	-10.00
RSO fob Dutch mill	MJJ		1,405.00	1,415.00	nc

Dry grains freight rates $/t

Route	Size '000t	$/t	±
Santos-Qingdao	60	69.40	+0.30
Kalama-Qingdao	65	47.25	+0.10

AGRITEL OUTLOOK

Watch out for increasing expectations of La Nina weather this winter, with the NOAA raising the probability of such conditions to emerge in Dec-Feb to 87pc.

Grains, oilseeds and veg oils tenders

Buyer	Issued	Closes	Status	Cargo	Delivery	Price	Seller	Notes
Turkey's TMO	14-Oct	21-Oct	Open	300,000t milling wheat	Dec-21			
Jordan's MIT	10-Oct	14-Oct	Closed	120,000t feed barley	Dec 2021-Feb 2022	$329.75/t	Cargill	cfr Aqaba
Japan's MAFF	12-Oct	14-Oct	Closed	119,512t milling wheat	Nov 2021-Jan 2022	Low 90s/MWZ	Mitsui	CWRS
Turkey's TMO	5-Oct	14-Oct	Closed	275,000t corn	15 Nov-6 Dec 2021	$306.90-317/t		cfr
Turkey's TMO	5-Oct	14-Oct	Closed	50,000t corn	15 Nov-6 Dec 2021	$312.75-319.25/t		exw
Jordan's MIT	7-Oct	13-Oct	Cancelled	120,000t milling wheat	Jan-Mar 2022			
Pakistan's TCP	5-Oct	13-Oct	Closed	90,000 milling wheat	Jan-22			

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