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# Fertilizer Focus

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# **Progress through innovation**



#### Written bv

Stef Worsley, Editor, Fertilizer Focus Magazine, Argus Media, UK

#### Welcome to the May/June 2024 edition of Fertilizer Focus! In this issue, OCI

Global presents a great case study on their new "lower carbon" ammonia production plant in Texas. Ammonia serves as a vital component in over half of the world's fertilizers, yet 99% of current ammonia production relies on unabated fossil fuels. With mounting pressure on the agricultural sector to reduce emissions, the potential for lower carbon ammonia to play a pivotal role in emissions reduction is significant.

In a related article, ATOME outlines their green fertilizer project in Costa Rica. The Latin American region is the world's largest import market for fertilizer as well as the world's food basket, meaning there is a demand for both regional supply and sustainable sources of fertilizer.

We have a special focus section featuring a number of articles on technological advancements for the fertilizer sector. Firstly, the Centre for Green Technology & Management in India discusses the current digital applications available for the industry, but point out that implementation of digitalization is sometimes difficult, particularly in large, conservative organizations where there is a predominant resistance to change.

Meanwhile, GlobeCore, put forward a new method for producing humic fertilizers. Humic substances are formed in soils as a result of biochemical decomposition and transformation of organic residues. Humic compounds accumulate in the soil over a long period of time and play a significant role in determining soil fertility.

In another article, NETZSCH-Feinmahltechnik, outlines a production process sulphur which involves wet grinding and uses less energy than conventional processes.

We also have two articles focussing on the African market. The first looks at the evolving methods of measuring fertilizer consumption across the region and the different approaches used in various countries. The article argues that national averages can be deceptive because they do not give any information on geography or crop use, and product versus nutrient content and therefore analysts need to look beyond fertilizer consumption in Kg/Ha.

The second article by the International Fertilizer Development Center (IFDC) discusses soil values in West Africa. Soil degradation has a considerable impact on agricultural productivity in West Africa. It is mainly linked to two factors: one associated with climate change and the other linked to anthropic factors.

In this edition, we are also continuing the "History of the modern mineral fertilizer industry" series. In this instalment, Michael Freeman looks at the Fertilizer developments in Russia and France in the early 20th Century.

I hope you enjoy the issue.



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History of the modern mineral fertilizer industry *Volume 2: 1900-1950 (Part 5)* 

# Industry progressions in **Russia and France**

In this fifth instalment of a six part series, Michael Freeman discusses the slow start to the industry in Russia and the developments in France. (Please refer to all editions of *Fertilizer Focus in 2022 for volume 1 covering the origins of the fertilizer industry)* 

#### **Russia/USSR**

The move to modernize agriculture in Europe and North America in the 19th century had not impacted on Russia and its empire. In the early years of the 20th century, mineral fertilizer use in Russia was minimal, consisting of some single superphosphate (SP) from local production, supplemented by small volumes of imports. The fertilizer situation did not change after the Revolution, when agriculture was

disrupted by the forced collectivization of farmland. However, the Communist government recognized its responsibility to increase the supply of mineral fertilizers and it incorporated measures into the First Five-Year Plan (1928-1932) to start building up a fertilizer industry, including the construction of:

- Two ammonia plants at Dzerzhinsk and Berezniki (with American aid)
- A potash mine at Solikamsk with German aid

 A mine and ore treatment plant to exploit the Kola apatite in order to supply raw material for the phosphate fertilizer industry

More ammonia plants were constructed during the rest of the 1930s and plans were drawn up for a second potash mine at Berezniki, but they could not be implemented until after the War. The impact of the new capacity is evident from the nutrient production and delivery data which show a surge to reach 700kt/y in the

At the start of the **20th century France** had the potential to become a major participant

second half of the 1930s. However, the situation changed when the USSR was invaded in 1942 and factories that were important to the war effort were dismantled and moved east. The new nitrogen fertilizer plants were affected because they were producing industrial nitrates for munitions. The closure of the potash mine contributed to the decline in fertilizer output, which fell to 250kt nutrients by 1945. After the War, fertilizer output recovered quickly and by 1950 the USSR was producing 1.2mn t/y nutrients, making it the third biggest producer after the US and Germany. Having the world's largest area of arable farmland, the USSR needed to generate a very substantial increase in fertilizer supplies. The so-called "chemization" of Soviet agriculture was eventually got under way by Khrushchev and his successors in the 1960s.

#### France

At the start of the 20th century France had the potential to become a major participant n the international fertilizer industry. With the largest arable land area in Europe, it offered the prospect of becoming a big user of mineral fertilizers. Although relatively slow in establishing a superphosphate industry, it had the advantage of proximity to the North African phosphate mining industry in Algeria, Tunisia and, later, Morocco - where it had financed and built the mining capacity. In 1910, a potash industry was established in Alsace, at that time part of Germany, which was transferred to France after WWI. At this

#### Table 1. USSR mineral fertilizer production and consumption in selected years ('ooot nutrients)

'ooo t nutrients	1913*	1928	1932	1937	1940	1945	1950
PRODUCTION							
N	3	2	11	156	199		391
P <sub>2</sub> O <sub>5</sub> **	14	23	163	398	336		558
K₂O		-		148	221		312
TOTAL	17	26	175	703	756	253	1,236
DELIVERIES							
N	3	2	5	135	162		307
P₂O <sub>5</sub> **	27	41	164	389	346		532
K₂0	19	2	11	167	219		422
TOTAL	42	45	180	692	727		1,261

\*data are for regions equivalent to the USSR \*\*including ground rock phosphate Source: Народное Хозяйство – various editions

time, the French government moved quickly to secure access to BASF's ammonia technology, something at which its British and American counterparts were less successful. During the same period, the French engineer Georges Claude developed a viable process for ammonia that was taken up by a number of companies in France and elsewhere. After the passage of five decades, France was established as the world's third largest producer of mineral fertilizers. after the United States and Germany, accounting for 11% of total nutrient supply in 1950.

French superphosphate output started to grow strongly in the 1890s, almost reaching the 1mn t level in 1900, and then adding another 1 million t over the next 12 years. Production fell back during WWI, then resumed the upward trend to peak at 2.3-2.4mn t in the second half of the 1920s. This was a historic high for the industry. The economic slump saw a decline to 1.2-1.4mn t/y in the 1930s when the industry was only using one third of its capacity. There was a further downturn in WWII before recovery to 1.2mn t in 1950. Basic slag supply from the French steel industry followed a similar pattern, ending at 1.5mn t in 1950.

The leading SP producer was St Gobain with 15 production sites spread across the country; the other important producers, such as Kuhlmann, Bordelaise, Pechiney and Auby, had a more regional focus. The French metropolitan market was also supplied by French-owned SP producers in Algeria (SAPCE, founded in 1906) and Morocco (Cie de Superphosphate founded by SAPCE and Kuhlmann in 1922). The Réno Hyperphosphate company set up a plant in Tunisia in 1929 to supply the French mainland market with ground rock phosphate fertilizer.

#### Nitrogen products

A gradual move to the introduction of concentrated compounds in France began with the production of ammoniated SP fertilizers: St Gobain started supplying Superam (4-16-0) in 1923, and Bordelaise followed with Phosamo (3-11-4). St Gobain commissioned a small phosphoric acid plant at Rouen in 1932, adding AN capacity in 1934 as the basis for NPK production. Meanwhile, the state-owned Potasses et Engrais Chimiques (PEC) was working on a nitrophosphate process for NPKs that would not need phosphoric



A post-world WWII co-operative grain collection silo building in northern France

acid capacity, eventually starting commercial production in 1942.

After the potash mines in Alsace came under French ownership at the end of WWI, production of potash fertilizers increased steadily over the next three decades, eventually peaking in 1973-1974. Société Commerciale des Potasses d'Alsace (SCPA) was founded by the government in 1920 to handle the sales of potash from these mines, and to negotiate the deal with the German potash syndicate that would give SCPA exclusive access to the market in French territories and a designated share of export markets. SCPA's effective promotion of potash fertilization to farmers in France caused K<sub>2</sub>O consumption to grow from 30,000t before WWI to 390,000t in 1950, when potash had become almost as important as phosphate in the country's agriculture.

#### *Pre-WWI nitrogen fertilizer situation in France was similar to the rest of Europe*

The pre-WWI nitrogen fertilizer situation in France was similar to that in other European countries, i.e. a low level of nitrogen use in relation to phosphates, with the main sources being Chile nitrate and by-product AS, plus a small tonnage of CCN. This started to change after WWI when several industrial processes for for fixing nitrogen became available, opening up the potential for supplying a wider range of N fertilizer products. In France, Georges Claude proved the viability of his process in experimental units and after the war his employer Air Liquide set up a joint venture with St Gobain – SA Chimique de la Grande Paroisse – to exploit the

process, building the first plant at Grande Paroisse, near Monterau, and following it with others at Grand Quevilly, Waziers and Liévin, while also licensing the technology to other companies planning ammonia production in France and elsewhere.

#### **Ephosphorus**

The Casale process was taken up by Henri Merle's Cie des Produits Chimiques Alais, Frogues et Camargue (AFC) which built a small plant at its St Aubin site in the French Alps and proceeded to market the process to coal companies, establishing Soc. Ammonia with three of them. One of

the other companies taking up the Casale process was was the Tunisian phosphate rock miner Soc. des Phosphates Tunisiens (SPT) which set up Soc. des Engrais Azotés et Composés (SEAC) to manufacture multi-nutrient fertilizers at Soulom in the Pyrenees. The plan was to produce ammonia and phosphoric acid, with the latter made at a nearby site from elemental phosphorus based on imports of Tunisian phosphate rock. The project, which had a modest success as a producer of N fertilizers, later morphed into Pierrefitte which built nitrogen capacity elsewhere in France. By 1927, Claude and Casale units were in operation or under construction in France at four and eight sites respectively.

Office National de l'Industrie de l'Azote (ONIA), the company formed by the government to develop a nitrogen fertilizer sector with German technology, commissioned a large ammonia plant at Toulouse in 1927. It used water gas as feedstock. Twenty years later, ONIA built a second unit to take advantage of the natural gas that had been discovered in southwest France.

In 1934 French ammonia capacity had grown to 250,000 t/y N, made up of 22 production units. The biggest production companies in terms of capacity were Kuhlmann (50 kt/yN), ONIA (41 kt/y), Grande Paroisse (39)kt/y) and Soc. Ammonia (24 kt/y). This contrasted with the situation in Germany, the UK and Italy in each of which the N fertilizer industry was dominated by a single big company, whereas in France several smaller producers were competing to build up market shares. The situation was made more complex with the entry of ONIA, the state-owned entity that seemed to have no clear strategy. ONIA had been willing to negotiate with the German nitrogen syndicate, but then chose not to join the French nitrogen producers association that agreed to participate in the new international nitrogen cartel set up by the German and British producers in 1931 to stabilize the market. The

#### Merle, Henri (1825-1877)

Born in Vienne, Isère, in the 1820s and educated in Paris as an engineer at the École Centrale des Arts et Manufactures, Henri Merle had a successful career as an entrepreneurial investor in the French chemical industry. He and the company he set up were only marginally involved with mineral fertilizers, but his business ended up becoming a component of Péchiney-St Gobain in 1960.

Merle founded a soda ash plant in 1856 at Salindres, Gard, supplying it with raw material from salt pans in the Camargue that he had also acquired. One of the by-products from the salt operation was the double salt potassium magnesium sulphate that he marketed in France as Sel Merle fertilizer. A few vears later Merle began producing aluminium at Salindres using the Deville process which needed soda ash. After Henri Merle's death the business was carried on by Arthur Rangod dit Péchiney, who started aluminium production by the electrolytic route at Froges, Isère, and at other sites where there was cheap electricity, which also favoured making chloralkalis by electrolysis. The company, renamed in 1921 SA Produits Chimiques Chimiques d'Alais, Froges et Camargue (AFC), acquired a licence for the Casale ammonia process to use waste hydrogen from its electrolysis plant at Saint Aubain, Alpes de Haute Provence, that led to the construction of a small ammonia plant there, but AFC also entered into joint ventures with coking companies ion northern France to use the Casale process, but ammonia remained a small part of AFC's operations.

After WWII, AFC reverted to being called Péchiney. At the end of the1950s Péchiney and Saint Gobain formed a joint subsidiary to hold their chemical interests that included agricultural chemicals (28% of sales), of which the main part was superphosphates and NPK compounds

French private sector group withdrew from the cartel after a year, and then proceeded to lobby the government in Paris for measures to protect their domestic market, against the wishes of the farming sector which favoured more competition among fertilizer suppliers to keep prices down at a time of depressed crop prices. The government made few concessions and the private-sector producers had to accept low operating rates, which was particularly painful for those who had invested in new capacity.

#### **Raw material shortages**

French N fertilizer production slumped below 90,000t in 1930/31, and slowly recovered in the following years, reaching 217,000t in 1938/39. During the war years that followed, the nitrogen industry was hard hit by shortages of raw materials (coal) and

labour, as well as transport problems, and by the end of the period its output had fallen to one third of the pre-war level. In 1946 the government made funds available to modernise and expand the industry, but production in the immediate post-war years had to be supplemented with imports of nitrate fertilizers, in addition to the regular deliveries of Chile nitrate that had been resumed. The enlarged industry was to facilitate the government's plan to raise annual N fertilizer use to 500,000t by the early 1950s, but progress was slower than anticipated because of the need to update agricultural practices. However, fertilizer use grew strongly over the next two decades so that in the final years of the 1970s France was using 5.5-6.0 mn t/y nutrients  $(N+P_2O_5+K_2O)$ and had overtaken the two Germanies to become Europe's biggest consumer of mineral fertilizers.



# Case study: Pioneering lower carbon ammonia production

### OCI Global's groundbreaking initiative in Texas

Written by

Beshoy Guirguis, VP Global Growth & Transformation, OCI Global

OCI Global is on the brink of a gamechanging move for the ammonia industry with the upcoming launch of a groundbreaking lower carbon ammonia facility in Texas. Set to commence production next year, this facility, fuelled by blue hydrogen, is poised to lead the charge in producing lower carbon ammonia, not only for the US market, but also for global ammonia consumers.

### Why the emphasis on blue hydrogen?

Ammonia serves as a vital component in over half of the world's fertilizers, yet 99% of current ammonia production relies on unabated fossil fuels. With mounting pressure on the agricultural sector to reduce emissions, the potential for lower carbon ammonia to play a pivotal role in emissions reduction is significant. There are several pathways to decarbonization, each at varying stages of development and availability:

- Replacing fossil natural gas with renewable and circular natural gas sourced from waste
- Substituting fossil hydrogen with renewable hydrogen generated

### *(left)* OCI Global's ammonia terminal at the Port of Rotterdam

through electrolysis powered by renewable electricity

 Implementing emission capture and sequestration technologies in fossil natural gas-based hydrogen production

OCI Global has been at the forefront of lower carbon ammonia production for the last few years, actively exploring each of these pathways. The company currently produces lower carbon ammonia from waste sources and has ambitious plans to integrate green hydrogen into its existing US ammonia facility.

### A major leap towards lower carbon ammonia

The most significant stride so far towards lower carbon ammonia production is the development of the world's first blue-hydrogen CCSbased ammonia production facility. This cutting-edge endeavour, named Texas Blue Clean Ammonia, is being constructed adjacent to OCI's existing ammonia and methanol facility in Beaumont, Texas. With construction well underway, the facility is will produce 1.1 mn t of ammonia annually in its initial phase, with the necessary infrastructure already in place to double that capacity.

Critically, any future expansion at the site will benefit from an earlymover advantage and use of existing infrastructure and utilities. The company is evaluating a second synthesis line at the site which could take its production capacity up to 2.2 million tonnes, further increasing lower carbon ammonia as a significant % of OCI's overall product mix and giving OCI the optionality to grow its customer base for lower carbon ammonia globally.

The planning to develop the facility had been underway for a decade and in 2022, the Inflation Reduction Act 45Q tax credit, which provides a tax credit for every ton of CO<sub>2</sub> captured and permanently stored in geological formations, increased from \$50 /t to \$85/t, providing additional financial security, enabling OCI to accelerate the development of the site and put its already-laid plans into action. The project reached FID (Final Investment Decision) in the first half of 2022 with ground being broken on the site later that year.

OCI has reported that it is in advanced discussions regarding long-term offtakes and potential equity participation, reflecting strong commercial interest and increasing appetite to pay a premium to secure long-term low carbon ammonia.

# Partnering with sector specialists

OCI are partnering with Linde who will supply hydrogen produced using carbon capture technology, coupled with transportation and sequestration infrastructure from ExxonMobil, with an aim to capture, transport and permanently store > 95% of the scope 1 GHG emissions in deep, underground, geologic formations, which could result in a > 70% reduction in total GHG emissions in the final ammonia product, compared with conventional production.

While the project is a first globally, each party within the project is playing to their industry experience and utilizing existing infrastructure and knowledge, which has been fundamental to the scale and speed of the project's development.

#### A future-proof approach

In addition to the potential for capacity expansion at Texas Blue Clean Ammonia, OCI has designed the facility to accommodate future integration of green hydrogen produced from renewable electricity. This forward-thinking approach ensures adaptability to evolving legislative and market demands.



The facility will also benefit from OCI's current export infrastructure in the Gulf of Texas, where it already exports both conventional and lower carbon ammonia and methanol from its existing facilities. Aligned with the uplift in lower carbon ammonia production, OCI is expanding throughput at its ammonia import terminal at the port of Rotterdam, Europe's busiest port, where it has the only ammonia import facility today. The expansion has the potential to increase throughput from 400 000 t per year today, to 1.2 mn t per year, making OCI well-positioned to meet the growing demand for lower carbon ammonia outside the US, driven in part by EU regulations such as the Carbon Border Adjustment Mechanism.

# Seizing opportunities in agriculture and beyond

The facility is being developed to meet demand for lower carbon ammonia across a number of sectors, such as for co-firing in power stations and as a shipping fuel, as well as the traditional ammonia market of fertilizer production. Regulation, particularly in Europe, such as the Carbon Border Adjustment Mechanism (CBAM), which will put a price on carbon coming into then block from 2026, or Fuel EU Maritime, which is driving the maritime industry towards lower carbon fuels, are set to boost demand for lower carbon ammonia towards 2030. These regulatory changes mean that while the lower carbon ammonia market is in its infancy today, projections for the markets suggest that demand could grow from 0.2 mn t per year today to 45 mn t per year by 2035.

Although much of that growth projection comes from new applications in the power and fuels sectors, rather than fertilizer use, the boost in production should be good news for fertilizer producers who recognize that change in the sector is inevitable. OCI is already working with a number of early-mover customers in the agriculture industry who are already using its lower carbon ammonia and fertilizers. Most recently,



Site construction of OCI Global's Texas Blue Clean Ammonia facility in Beaumont, Texas, USA

at the beginning of April 2024, OCI announced it would be supplying lower carbon ammonia to its long-term customer and global fertilizer producer, COMPO EXPERT, for the production of NPK fertilizers. This new agreement will see COMPO EXPERT begin to replace the conventionally produced ammonia supplied by OCI with the lower carbon version at its facility in Krefeld, Germany. This latest collaboration builds on partnerships OCI has previously announced to supply lower carbon fertilizers to be used in the food and drink sector, including to Simpsons Malt plc in the UK and European agricultural trading company, Agravis.

So, while other industries are driving confidence in demand for lower carbon ammonia, the boost the new supply that facilities like OCI Global's

Texas Blue Clean Ammonia plant can support the agriculture sector in making the shift to decarbonize.

#### A path forward for sustainable agriculture

The urgency to address emissions from the agriculture sector has been underscored by initiatives such as the COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action.

Nitrogen fertilizers support nearly half of the world's food supply, but are also responsible for around 5% of total global greenhouse gas emissions. That is more than global aviation and shipping combined, or more than the emissions of all but

the three highest emitting countries. The COP declaration being signed by 134 world leaders demonstrates that governments are starting to seriously turn their attention to emissions from agriculture and farming in their national climate change plans. As these plans materialize, the production of lower carbon ammonia at scale will be needed globally. With renewable electricity demand due to face increasing demand from other sectors, blue hydrogen-based ammonia facilities could be the answer for fertilizer producers. With its innovative approach and strategic alliances, OCI Global's Texas Blue Clean Ammonia facility represents a standard bearer for a more sustainable future in fertilizer production and beyond.



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# **News in brief**

#### **EUROPE**

#### EU hands out more ETS allowances to aid clean producers

The European Commission has tweaked its emissions trading system (ETS) to help producers of cleaner products such as renewable hydrogen, green steel and green ammonia compete against cheaper fossil fuel-based incumbents.

The EU expanded its list of products eligible for free ETS allowances to include lower-carbon production routes. Producers that use mainly renewable electricity and hardly emit CO<sub>2</sub> have not been eligible for free allowances, but in future they will receive the same allowances as fossil rivals for their products. Having no emissions to account for, they should be able to sell their allowances for profit.

The commission currently allocates free ETS allowances to energy-intensive industries covered by the scheme to guard against carbon leakage, whereby companies relocate to other jurisdictions to avoid carbon costs.

The new regulation applies to allocations relating to the period starting 1 January, and it will benefit producers of renewable hydrogen, green steel, green iron and green ammonia, among other products. But hydrogen made as an intermediary step to make ammonia will not be eligible, possibly to avoid double counting. Hydrogen made as a by-product of industrial processes will also not be eligible.

Products covered by the EU's carbon border adjustment mechanism (CBAM) will be subject to a gradual phase-out of free allowances as the mechanism is phased in from 2026, as per CBAM rules agreed last year.

The amendment will encourage companies to use low-carbon technologies and "create a level playing field", the EU's delegated act said.

New renewable hydrogen companies could start receiving ETS allowances from 2025 based on their production from 2024, according to industry body Renewable Hydrogen Coalition. Sales of the ETS allowances could generate EUR0.26-0.68/ kg of renewable hydrogen produced, based on a carbon price of EUR60-100/t of CO<sub>2</sub> equivalent, it estimated. This should improve the business case for electrolysis projects, but those amounts could change from 2026, it added.

The free allocations will come from the New Entrants Reserve which the EU has set aside, meaning this will not affect free allocations going to incumbent players, according to Renewable Hydrogen Coalition.

Industry association Hydrogen Europe said the change was overdue and agreed that the allowances will not last long, as hydrogen's inclusion in CBAM means the ETS allowances will be gradually phased out until 2034, it said.

#### Yara production, deliveries rise in 1Q

Norwegian fertilizer producer Yara has said its production and deliveries rose on the year in the first quarter, with the latter notably higher in Europe.

The company said total fertilizer deliveries — including urea, nitrates, NPKs, CN, UAN, potash and phosphate products were 5.2mn t compared with 4.7mn t in the same period of 2023.

Deliveries in Europe were up by 37% in that time, having been affected last year by "a declining price environment and production curtailments". But deliveries in the Americas were down by 10%. Yara said demand in the region is sluggish outside the main application season, and there is "increased hand-to-mouth buying in Brazil".

The company said the demand outlook appears supportive for upcoming seasons, but the supply-demand balance may tighten in the longer term.

"While the peak of new capacity additions is now behind us, urea supply is currently strong primarily owing to increased production in India and China," it said. "However, industry consultant projections show significantly lower supply growth from 2024 onwards."

Yara's own fertilizer production rose to 4.6mn t in the first quarter of this year from 4mn t a year earlier. There was a 40% rise in urea production to 1.2mn t. Its costs of production were sharply lower from the previous year's elevated levels. In Europe, the first-quarter weighted average cost of gas was 52% lower than a year earlier, and globally it was down by 43%. This pushed Yara's operating costs down by 20% on the vear to USD3.17bn.

But lower selling prices pushed the company's revenue down to USD3.32bn from USD4.16bn, and its profit to USD16mn from USD105mn.

#### Anglo American rejects miner BHP's takeover proposal

UK-South African miner Anglo American has rejected Australian resources firm BHP's takeover proposal, after evaluating that it "significantly undervalues" Anglo American and its future prospects.

The GBP31bn (USD38.8bn) all-share offer from BHP pegged a total value of approximately GBP25.08 per Anglo American ordinary share, including GBP4.86 in Anglo Platinum shares and GBP3.40 in Kumba shares.

The takeover proposal came with a requirement for Anglo American to complete two separate demergers of its entire shareholdings in Anglo American Platinum Limited and Kumba Iron Ore Limited to Anglo American shareholders.

Copper represents 30% of Anglo American's total production and with the benefit of growth options in copper and other structurally attractive products, "the board believes that Anglo American's shareholders stand to benefit as the full impact of those trends

materialise", said Anglo American chairperson Stuart Chambers. The BHP proposal is "opportunistic and fails to value Anglo American's prospects", the firm added.

#### GEP raises USD30mn for renewable H2 plans

European hydrogen project developer Green Energy Park (GEP) has secured USD30mn in an initial equity funding and has obtained long-term rights to port facilities in Luis Correia, Brazil.

This initial funding round underscores strong interest from strategic partners, global offtakers, and financial institutions, the company said.

GEP plans to build a renewable hydrogen and ammonia production plant with 10.8GW electrolyser capacity in the special economic zone of Parnaiba in Piaui, located close to the Luis Correia port. Most of the facility's supply could be delivered as ammonia to GEP's planned import hub in Krk, Croatia, while the remainder would be distributed to various other ports global, GEP said.

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Expected to come online in 2028 and reach full production capacity by 2035, the Piaui project will entail investments of EUR10bn, Piaui governor Rafael Fonteles told Argus last year.

The project will receive support from EU as part of a EUR2bn initiative for Brazil's hydrogen sector announced last year.

#### **NORTH AMERICA**

#### **U.S.** Department of Agriculture awards Novaphos USD3.9mn grant through the **Fertilizer Production Expansion Program** (FPEP)

The United States Department of Agriculture (USDA) has announced that Novaphos will receive a USD3.9mn grant under its Fertilizer Production Expansion Program (FPEP), which was established to increase and diversify fertilizer manufacturing in the United States. FPEP grants are administered by USDA, Rural Development and Rural Business-Cooperative Service (RBCS). For more information on the grant announcement, please click HERE.

Specifically, federal support will be used to provide financing for engineering, working capital, and equipment upgrades to expand production at Novaphos' facility in rural Florida. The scope of this award will also include design and engineering



for a larger-scale facility capable of producing 22,000 t of superphosphoric acid and 90,000 t of J-Rox annually.

For the last ten years, Novaphos has led the development of a modern, low-waste, low-cost process to produce high-quality phosphoric acid, a vital ingredient in manufacturing fertilizers. Through a series of patents and proprietary technological innovations, Novaphos is revolutionizing the production of one of the most valuable resources on the planet to ensure it remains available and produced sustainably.

The following is a statement from Timothy Cotton, Chief **Executive Officer of Novaphos:** 

"The way phosphate is produced is broken: current production processes are wasteful and destructive to the environment. For years, the phosphate industry has seen very limited technical change. The result is that we are wasting one of our most valuable minerals, which is vital for multiple applications in the United States and around the world, from agriculture to batteries for the energy transition.

"Novaphos technology represents groundbreaking innovations that will completely revolutionize how phosphate is mined and processed, with increased efficiency at lower cost, higher margins, and reduced environmental damage. Perhaps most important, it will help ensure that enough phosphate will remain available for future generations.

"This grant will significantly assist our current efforts to scale operations and production efficiently and swiftly in the United States. This will help ensure the US continues to benefit from a robust and long-term domestic supply of phosphates. We are thankful that the USDA recognizes American-driven innovation, and receiving this FPEP grant certainly verifies and reaffirms our work and development over the last decade."

#### ABB signs agreement to support major Power-to-X green hydrogen project in the US

ABB is collaborating with Green Hydrogen International (GHI) on a project to develop a major green hydrogen facility in south Texas, United States. As part of the Memorandum of Understanding (MoU) ABB's automation, electrification and digital technology will be assessed for deployment at GHI's Hydrogen City project. The Power-to-X facility will use solar and onshore wind energy to power a 2.2 GW electrolyzer plant to produce 280,000 t of green hydrogen per year, which will be turned into 1.0mn t of green ammonia annually.

The project will utilize underground salt cavern storage, which is seen as an efficient way to store large volumes of hydrogen onshore. The planned storage of up to 24,000 t of green hydrogen will help balance out the intermittency of the renewable energy sources powering the operation and allow for a lower levelized cost of hydrogen.

A 120-kilometre pipeline to the nearby Corpus Christi energy port, approximately 300 kilometres southwest of Houston, will transport the green hydrogen to an ammonia production facility for conversion and subsequent global export to serve demand in Europe and Asia. GHI is also in discussions with potential off takers of green hydrogen as a feedstock for sustainable aviation fuel and e-methane production.

ABB has already completed a feasibility study to develop an electrical system architecture that optimizes return on investment for the project and supports compliance with EU legislation governing Renewable Fuels of Non-Biological Origin (RFNBO) and the US Inflation Reduction Act (IRA).

MoU scope includes electrical motors and drives, measurement and analytics solutions, and power and process optimization solutions.

"We are proud to collaborate with GHI on Hydrogen City, to explore how our automation, electrification and digital technology can support and scale this ambitious green hydrogen production facility," said Brandon Spencer, President of ABB Energy Industries. "Together, we will enable efforts to decarbonize global industry and progress towards a net-zero future."

The global green ammonia market, valued at USD0.3bn in 2023, is set to reach USD17.9bn in 2030, growing at a compound annual growth rate (CAGR) of 72.9%. Ammonia has the potential to support decarbonization efforts as part of the energy transition through its use as an alternative fuel for heavy transport such as shipping, as well as its current major use in fertilizer production.

#### BioConsortia secures USD15mn in latest funding round

BioConsortia has announced that the Company has closed an internal financing round that will fund expanded development of microbial products designed to increase crop yields by fixing nitrogen or controlling nematode, fungal and soil insect pests. Existing investor Otter Capital led the round, excited by progress shown in recent field trial results, as well as new discoveries that further enhance BioConsortia's microbial gene-editing leadership position.

According to Marcus Meadows-Smith, BioConsortia CEO, "We have validated the consistency and impact of our nitrogen-fixing seed treatments through hundreds of field trials across a wide array of crops in recent years. This announced investment underlines our confidence that these technologies, with their extended shelf- and on-seed life, set a new standard for nitrogen-fixation products."

The raise will fund broadened field trial programmes in key agricultural regions around the world. With recent discoveries that further BioConsortia's leadership in microbial geneediting, the Company will also invest in expanding its intellectual property estate.

BioConsortia will also use the proceeds to enlarge their Davis, CA, lab to accommodate their growing microbial gene-editing team, as well as to upgrade fermentation and formulation capabilities at the Davis headquarters, as the Company's biofungicide, bionematicide, postharvest decay control and nitrogen-fixing products approach commercialization beginning in 2024.

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### **Daily Fertilizer Price Assessments**

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#### SOUTH AMERICA

#### Petrobras, CNCEC partner for fertilizers and energy

Brazilian state-controlled oil company Petrobras and Chinese National Chemical Engineering (CNCEC) signed a memorandum of understanding to evaluate potential deals in Brazil on renewable energy and energy transaction.

The companies said they will consider new deals for crude exploration, fertilizer production from natural gas and other sources, refining, biorefining, petrochemical manufacturing, engineering, construction, services and research.

The agreement is for two years and will start immediately with a fertilizer and petrochemical assets' analysis.

The agreement is in line with Petrobras' 2024-28 strategic plan, which seeks to accelerate energy transition projects and invest in fertilizer production.

Petrobras signed a tolling contract with Brazilian petrochemicals group Unigel in January, enabling nitrogenbased production at Unigel's units in Sergipe and Bahia states. In February, the company also signed a preliminary agreement with the Norway-based global fertilizer producer Yara to study new fertilizer initiatives in Brazil.

#### Brazil potash project in Amazonas receives license

Amazonas state's environmental agency lpaam issued an environmental license to install Potassio do Brasil's Autazes project.

Valid for three years, the license authorizes the construction of the complex, including an 800-metre deep mine.

Ipaam granted a preliminary license to Potassio do Brasil in 2015, which is a subsidiary of Canadian firm Brazil Potash. But a state court suspended the license in September 2023, ruling that it should have been granted by the federal environment watchdog Ibama instead, following allegations submitted by a public civil suit. Amazonas state's federal regional court overruled the suspension in October 2023 under the argument that the mine is not in an indigenous territory.

The installation license comes with 26 restrictions/conditions, including the protection of the fauna, maintaining preserved areas, a report of activities every six months and suspension of activities any type of archeological, historical, or artistic vestiges are verified.

The company projects to invest around USD2.5bn in the project, with the construction phase set to last around four and a half years. Potassio do Brasil also plans to build a port in Autazes city to ship the mineral.

The Autazes project is scheduled to initially produce 2.2mn t/yr of potash. That is Brazil's main potash project and is considered the most promising to reduce the country's dependency on imports under the national fertilizer plan.

The project is expected to provide around 20% of Brazil's potash requirements. The national fertilizer plan aims to reduce the share of fertilizer coming from imports to around 40% by 2050, down from nearly 85%. Brazil currently imports more than 95% of its potash needs.

#### **AFRICA**

#### **OCP and Fortescue explore green projects** in Morocco

Moroccan fertilizer giant OCP Group and Australian iron ore and renewable energy firm Fortescue Energy have announced a joint venture in Morocco to produce green hydrogen, ammonia and fertilizers for domestic and export markets.

The partnership will look into developing a production facility, alongside a research and development (R&D) hub, to advance the renewable energy industry in Morocco.

The partners have proposed plans for four projects in Morocco. The production facility will involve large-scale integrated green ammonia and green fertilizer production capacity, including renewables, energy generation, electrolysis, ammonification and fertilizer production.

The venture will also look at developing the manufacturing of green technology and equipment. The third element is an R&D and technology hub, located near Marrakech, to bolster research in renewable energy, green hydrogen and minerals processing. OCP and Fortescue also outlined collaboration of corporate venture capital funds to drive investment in key technology advancements.

Further details about potential production volumes, timelines and financial investment have not been disclosed. The venture is subject to customary closing conditions, including regulatory approvals.

Morocco is hoping to be a major participant in the global energy transition because of vast wind and solar resources, two large coastlines, and its proximity to Europe and the Americas. Its lack of gas resources results in significant annual ammonia import requirements for fertilizer production. The region has previously touted longer term plans to reinforce its domestic supply chain by building ammonia plants in Morocco and reducing its reliance on imports.

OCP is one of the biggest global importers of ammonia used as a raw material for phosphates and NPK production, consuming around 10% of global merchant trade. Moroccan ammonia imports are set to reach nearly 2mn t this year into Jorf Lasfar. OCP buys predominantly from the Americas and the Middle East, having previously been dependent on Russian ammonia.

OCP's plan to use green hydrogen produced from solar and wind power as a raw material to make ammonia is part of a USD13bn green investment strategy the company announced last year to transition to 100% renewable energy by 2027.

Nearly 100 domestic and international companies have expressed interest in setting up renewable hydrogen projects in Morocco, according to the government. Most projects are still in the early stages and will take years to start production.

#### **ASIA**

#### Asia Potash commissions third Laos MOP unit

Laos-based potash producer Asia Potash said it has carried out a successful trial of its third 1.0mn t/yr MOP unit, which it aims to start operating later this year.

Commissioning of the unit has been delayed from the end of March following delays in the construction of incline shafts and ramps, as well as a supporting ground plant, Asia Potash said.

Asia Potash is one of the two Chinese-backed potash mining projects in Khammouane, Laos with a current installed capacity of 2mn t/yr. Laos is increasingly becoming a key MOP source for China, with January-February deliveries increasing by 70% from a year earlier to 320,000t. The company's MOP production target this year remains at 2.8mn-3mn t with a target of 5mn t by 2025.



But personnel changes at Asia Potash have raised concerns among investors about the potential impact on the company's MOP production in Laos.

Its chairman Guo Baichun was arrested in Laos and repatriated to China on 22 March for alleged dereliction of duty while serving as a government official in Ningxia Hui region during 2013-18. He joined Asia Potash in January 2020. Its deputy general manager Tong Yongheng also resigned from all his positions for personal reasons less than a week of the chairman's arrest, according to a company on 3 April. Tong joined Asia Potash in April 2022 as executive director and general manager in subsidiaries such as Sino-Agri International Potash and Sino-Agri Potash, in addition to his role as deputy general manager at Asia Potash.

Asia Potash has repeatedly stated that the investigations are unrelated to the company's business and has no impact on its production.

#### Russia extends fertilizer export quotas to end November

The Russian government has extended its largely notional quota system for shipments of selected finished fertilizers to 30 November.

The quotas for 1 June to 30 November will total 19.7mn t, of which 12.4mn t will be for nitrogen-based fertilizers and 7.3mn t for complex and phosphates-based products.

The major nitrogen products — urea, UAN and ammonium nitrate (AN) with HS codes 31021010, 31021090, 310280, 31023010 and 31023090 — will be limited to shipments totalling 12.46mn t. AN shipments will be held to 4.77mn t in the period.

Phosphates-based products NPKs, MAP and some NPs — with HS codes 31052010, 31052090, 310540 and 310559 — will be limited to 7.28mn t in the period. DAP shipments will remain free to export without quotas.

The government took the decision in a bid to maintain sufficient supplies for the domestic market and to ensure the country's food security, according to the cabinet ministry. But exports of nitrogen-based fertilizers were likely significantly below the cap last year, with 9.48mn t of urea, 3.15mn t of AN and 1.89m t of UAN railed to seaports through all of 2023.

The industry and trade ministry will distribute the quotas among suppliers. The quotas from 1 December 2023 to 31 May of this year totalled 16.9mn t.

Russian export quotas on certain fertilizers — initially urea, AN, UAN, NPKs, DAP, MAP and NPs — were imposed at the start of December 2021.

### Japan's Jera joins CF Industries' US ammonia project

Japan's largest power producer by capacity Jera has decided to partner with US ammonia producer CF Industries to develop blue ammonia production in the US, looking to bring more than 500,000 t/yr of the clean fuel into Japan.

Jera has signed a joint development agreement with CF Industries, and is contemplating securing a 48% stake in the proposed project at the latter's Blue Point complex in Louisiana, Jera said on 18 April. The project is estimated to produce around 1.4mn t/yr of low-carbon ammonia. The partners aim to make a final investment decision within a year and start production in 2028.

Under the deal, Jera is exploring the possibility of procuring more than 500,000 t/yr of ammonia to use for co-firing at its Hekinan coal-fired power plant and other sites. The company is now demonstrating the use of a 20% ammonia fuel mixture at its 1GW N0.4 unit at Hekinan, and aims to start commercial operations with this ratio from the April 2027-March 2028 fiscal year.

Jera signed an initial agreement with CF Industries in January 2023 to assess the possibility of a partnership to buy blue ammonia and jointly develop upstream production. This was the result of its tender to select partners to secure up to 500,000 t/yr of fuel ammonia for the Hekinan No.4 coal-fired unit from 2027-28 until the 2040s.

Jera has separately continued discussions on similar potential collaborations with Norway-based fertilizer

producer Yara, which also won Jera's tender, to buy up to 500,000 t/yr of blue ammonia and develop the 1mn t/yr production project in the US Gulf coast.

Jera aims to import around 2mn t/yr of fuel ammonia in 2030, which is nearly 70% of Japan's current 2030 ammonia demand target of 3mn t/yr. The company also signed a framework agreement with ExxonMobil in March to jointly explore the development of blue hydrogen and its derivative of ammonia at ExxonMobil's Baytown complex east of Houston, Texas, and is exploring the possibility of importing around 500,000 t/yr of ammonia and securing a stake in the project.

### Eurochem enters phase 2 of Usolskiy potash project

Russian potash producer Eurochem has started the second phase of its Usolskiy potash project, which will increase its total potash capacity to 4.7mn t/yr.

The producer has started work at a new 1.8mn t/yr unit, which forms the second phase of the expansion plans at Usolskiy mine in the Perm region of Russia. Construction is expected to be completed in 2027.

Based on its target capacity, the current MOP capacity at Usolskiy is around 2.9mn t/yr. Eurochem shipped 2.4mn t of MOP from the mine last year, forwarding agents' data show.

#### **AUSTRALASIA**

### Agriflex to supply phosphoric acid to Lithium Australia

Australia-based phosphate rock producer Agriflex has agreed to supply high-quality phosphoric acid to Lithium Australia for its lithium-iron phosphate (LFP) or lithium manganese iron phosphate (LMFP) production.

The firms have signed a non-binding initial agreement, which envisages Lithium Australia building a demonstration plant with an estimated capacity of 250 t/yr of LFP or LFMP, potentially in Queensland. The plant will require around 200-300 t/yr of phosphoric acid, Agriflex's parent company Centrex said on 16 April.

Lithium Australia will move on to build a commercial plant with an estimated capacity of around 25,000 t/yr of LFP or LMFP if the demonstration plant is successful and following pre-qualification of cathode powders. The commercial plant will need 20,000-25,000 t/yr of phosphoric acid. No timelines were provided, except that the initial agreement will run for a period of 24 months.

Agriflex will conduct a study to produce high-quality phosphoric acid with low impurity content in Queensland for supply to Lithium Australia.

The two firms are committed to building a battery supply chain domestically in Australia, to provide global battery producers an alternative supply source for LFP and LFMP.



# MARKET ANALYSIS >

#### **Commodity updates • Shipping news • Price watch**

# Soft commodities: Australian wheat to SE Asia climbs

Information from Agritel – An Argus Media company

#### Wheat summary

Offers of Australian Standard White (ASW) wheat for delivery to southeast Asia rose by about USD<sub>5</sub>/t, following the wider wheat complex, and as a result widening the Black Sea-Australia origin spread to USD12.50/t.

Meanwhile, Black Sea 11.5% protein content wheat remained attractive to buyers in southeast Asia around USD267/t cfr Java ports, with sellers now also offering Russian-origin product. But prices in Black Sea fob markets were more volatile. Sellers of Russian wheat returned, offering volumes of 12.5% protein content product shipping from the port of Novorossiysk below the previous day's bids. The sellers were likely looking to cash in on recent demand. Bids also dropped a little, narrowing the bid-offer spread to USD2/t.

This downward shift came despite concerns over Russia's new-crop yields, with persistent dry weather in southern parts of the country dominating market sentiment, according to traders. Ukrainian 11.5% wheat prices also shed value at Pivdennyi/Odesa/Chornomorsk (POC) ports, with spot old-crop offers falling to USD205/t, in line with July and August-shipping new-crop cargoes.

Meanwhile, at Danube River ports, wheat prices gained value on the country's low milling-grade supply. Bids and offers alike moved USD<sub>3</sub>/t higher on the day on a fob Danube River ports basis, bringing buyers and sellers no closer to a consensus

#### In China's corn market, farmers have now sown more than 10% of the crop

on price ideas for small volumes of available product. And in Ukraine's domestic market, it was cpt POC milling wheat prices that found support, boosted in part by low supply and a strengthening Ukrainian hryvnia to US dollar exchange rate.

Elsewhere, premiums for Canadian Western Red Spring (CWRS) wheat shipping from Vancouver against Minneapolis-listed futures converged slightly, with traders stepping back from May to June shipments on a lack of prompt availability and the possibility of a rail strike next month. which could delay deliveries to port. Month-ahead levels held a premium of around CADo.o5/bushel (¢/bu) to spot loadings, according to market

participants. That said, market participants' focus was held by new crop Canadian wheat, traders said.

#### Corn summary

Ukraine's spot corn price on a fob Pivdennyi/Odesa/Chornomorks basis closed flat, resisting pressure from cancellations of China-bound volumes. In Ukraine's cpt POC market, the spot corn price firmed recently, although the gains were driven largely by fluctuations in the exchange rate between the Ukrainian hryvnia and the US dollar.

And despite a drop in Ukraine's weekly corn exports, cumulative volumes since the start of October surpassed









year-ago levels. And buyers returned to seek cargoes on an fob Reni/Izmail basis for shipment to Romanian ports, market participants said, after a lull in the flow.

As for larger volumes loading at Ukraine's deep-water ports, buyers may have cancelled previous purchases of as much as 500,000t of Ukrainian corn bound for China so far, market participants said. And some additional volumes are under negotiation, because of China's decision to cap processors' use of corn at bonded zones, which are exempt from the imports quota. But the demand may be shifting to other feed grains instead. Buyers showed firm interest in Russian and Kazakh origin feed wheat for delivery to China, because processors are switching from corn to feed wheat as feedstock.

As for China's domestic corn market, farmers have sown more than 10% of the total areas for 2024-25 corn crop, according to the country's Ministry of Agriculture and Rural Affairs (Mara). The overall pace for spring crops was slightly faster than a year ago, but seeding is yet to begin in the country's main corn producing regions in Northeast China and the North China Plain.

#### **Oilseeds summary**

The Paranagua soybean paper market had little movement on Wednesday. while the farmer selling pace for the

2023-24 soybean crop was also lower. Market participants estimate that the recent devaluation of the Brazilian real to the US dollar pushed producers to sell approximately 12mn t recently, combined with other factors such as farmers' financial needs and progress of the harvest. But the peak of the exchange rate has passed, and a large portion of producers are already covered for the short-term, slowing down movement in the country's oilseed market. The range of offers and bids for June ended the day at a premium of CAD0.20-0.15/bu to the CBOT, from a premium of CADo.20-0.17/bu previously. For July, the range closed at a premium of CAD0.38-0.25/ bu, compared with a premium of CADo.40-0.27/bu towards the end of April.

China's purchases lifted June-loading premiums, but the lack of interest in far-curve cargoes pushed premiums for those loadings lower. Crushers booked at least two soybean vessels overnight, shipping from Brazil in May, as well as in late May to early lune. Premiums for both cargoes were at CAD130/bu cfr over the July Chicago Board of Trade futures contract. The fresh deals combined with the purchases China made further boosted the premium, by CAD1.5/bu for Juneloading on the day.

Meanwhile, buyers were not in a hurry to seek far-curve cargoes, which resulted in weakening cfr premiums for July-November shipments. The export window for July loading will remain open for the next 8-10 weeks, while for forward-months cargoes traders have even more time to make decisions.

A weaker Brazilian real to the US dollar has slowed farmer sales in Brazil, and only about half of the soybeans produced in 2023-24 have been sold so far. This was below the pace in the previous year and the five-year average, indicating bulk exportable stocks, which could further pressure soybean prices in the coming weeks. In China's local market, the National Grain Trade Centre offered 113,700t of imported sovbeans for auction of which 30.1% was traded.

# Hard commodities: **Signs of green shoots**

#### Written by

David Fyfe, Chief Economist, Argus Media, UK

North Sea Dated crude has moved above USD90/bl in early-April, largely due toa combination of actual and anticipated further tightness in oil supply. A combination of geopolitical risk in the Middle East, extended **OPEC+** supply restraint and Ukrainian attacks on Russian refining capacity underpin the recent shift higher. While higher crude prices themselves risk deferring the advent of monetary policy loosening by Central Banks, nonetheless there are initial signs that global economic activity is stabilising in the face of ongoing supply chain pressures and elevated interest rates. Healthier growth in the second half of 2024 will be an essential pre-requisite for sustained strength in oil and commodity prices, not least as OPEC+ oil producers consider loosening supply limits.

Crude futures are USD8 above a month ago, with North Sea Dated breaking through USD91/bl and market backwardation steepening. Arguably, this prompt price rally derives from the supply side of the ledger, with Russian refineries facing a second month of 600-700 kb/d of outages due to Ukrainian drone strikes, OPEC+ extending voluntary supply cuts through mid-year and pledging to curb non-compliance, and as military strikes targeting senior Iran Revolutionary Guard Corps commanders in Syria are perceived (potentially inaccurately) to have raised the likelihood of broader regional conflict.

However, a holistic look at both supply and demand is needed to ascertain if



the recent rally will prove durable or simply another oscillation around a long-standing USD85 tether for Brent. Given a combination of 1.5 mb/d of non-OPEC supply growth this year - in line with expected demand growth and 5 mb/d of OPEC spare capacity, so price strength will also require evidence of an improving macroeconomic backdrop and the potential for an upgrading of oil demand estimates if it is to be sustained.

#### Inflation rates

Of course, crude prices at or above USD90 when Central Banks are trying to squeeze inflation out of the system risk delaying monetary easing and could thwart any upward revisions to erstwhile anaemic GDP growth projections for 2024. Much will depend on offsetting declines in the core components of inflation that exclude energy and food.

Policymakers have been at pains to spell out that although Atlantic Basin consumer price inflation has fallen back sharply from 2022 peak levels, the final decline to erstwhile 2% target levels could take longer to achieve. Indeed some commentators suggest that a new, higher target level for inflation needs to be determined, given that maritime freight disruptions, elevated debt and public spending levels, commodity arbitrage disruptions caused by the war in Ukraine and, over the longer term, the inflationary impact of energy transition could all keep commodity and manufacturing costs structurally higher than has historically been the case.

That said, recent indicators suggest that ongoing disruptions to maritime trade flows via the Red Sea and

Panama Canal notwithstanding, overall global supply chain bottlenecks are much less pronounced than in the aftermath of the Covid-19 pandemic. Current events may be stretching cargo routes and adding to overall freight costs but the combination of globally resurgent demand growth and widespread shortages in cargo handling capacity that characterised late-2020 and 2021 is absent in early-2024.

#### **Deflationary pressures**

Leaving aside inflationary risks for now, economic data in the last month provide scope for optimism. Leading indicators for global merchandise trade in February were running an average +10% Y-o-Y. Meanwhile, though March manufacturing PMI data remained mixed, crucially for the first time since June 2022, the global, US, Chinese and Indian readings were all in expansionary territory together. Readings from Japan, Korea, Taiwan, Malaysia and Vietnam were less encouraging, while Europe confronts a stark contrast between healthy service sector expansion and ongoing manufacturing decline. German manufacturing in particular remained very weak, with a PMI reading of 41.9 amid slack demand and further factory job losses. However German industrial managers remain confident of improving demand in the second half of 2024.

The Chinese economy which accounts for around 30% of global trade in key commodities continues to face a number of challenges. Ongoing weakness in the real estate sector, allied to anaemic retail spending and consumer confidence have characterised the first three months of 2024. China therefore confronts deflationary pressures as distinct from the inflationary pressures that afflict the Atlantic Basin. Moreover, the weakness of the Yuan and President Xi's policy priority of reducing debt have limited monetary and fiscal stimulus respectively. Nonetheless, official manufacturing and services PMIs picked up speed in March and



last month's legislative meetings in Beijing announced an RMB1 trillion central government special bond issuance that will be targeted towards high technology manufacturing and beefing up supply chains and logistics. As a result, forecasters have been upgrading 2024 GDP growth estimates closer to the government's 5% target level.

February Eurozone unemployment remained largely unchanged at 6.5%, near year-ago levels. Indeed Atlantic Basin central banks' "soft landing" narrative has been supported so far by muted unemployment despite interest rate hikes. US unemployment is also stable at 3.9%, well below predictions that 5%+ US interest rates could conceivably double the jobless tally. With March Eurozone consumer price inflation falling to 2.4% (despite global shipping delays) the stage may be set for initial ECB monetary policy loosening by June.

#### **Monetary policies**

European interest rates might even begin falling sooner than those in the US, which of course could lend extra support to an already-strong US dollar. High-debt commodity import dependent emerging market economies remain susceptible to US

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dollar strength, but pressures here could ease assuming the Federal Reserve does indeed begin cutting rates in the summer. Moreover, broader debt default concerns have been assuaged since Egypt in March averted a potential financial and economic crisis with policy reforms that unlocked external funding deals with the UAE, IMF, World Bank and EU. Given Egypt's pivotal role in the quest for peace in the Israel-Hamas conflict, lenders will have been anxious to prevent the country sliding towards default.

None of this is to suggest that the global economy is primed for imminent lift-off. But as improving springtime activity levels have so far seemingly avoided stoking inflation, so the beneficial impact of monetary policy loosening could begin to ripple through markets from the second half of 2024 onwards. Certainly OPEC+ producers will be hoping there is no unexpected downturn in the global economy ahead as they consider unwinding 2.2 mb/d of voluntary production cuts from June onwards, and with a further 3.6 mb/d of output curbs which lapse at the end of the year. However, even a fair tailwind from the global economy is unlikely to permit anything other than a very gradual re-instatement of these volumes.



# **Shipping and trade news**

#### Singapore, Australia tie up to decarbonise shipping

Singapore's Marine Port Authority (MPA) and Australia's National Science Agency (CSIRO) have formed a partnership to work on decarbonising shipping, they said during Singapore Maritime Week 2024.

The Australia-Singapore Initiative on Low Emissions Technologies (ASLET) will research and attempt to scale up solutions for a green and digital shipping corridor between the two countries. Both governments signed an initial agreement to develop the green corridor in March.

The ASLET initiative aims to accelerate research, demonstration and commercialisation of low-emissions technologies and fuels for maritime shipping and port operations, as well as opportunities for Singapore and Australia to cooperate in these areas. "We need to focus on transitioning to low-emissions fuels such as ammonia and hydrogen by developing accessible technology and infrastructure at ports that supports a range of vessels," CSIRO chief executive Dr Doug Hilton said.

Singapore will commit up to SGD10mn (USD7.3mn) and Australia will give up to AUD10mn (USD6.4mn) to deliver projects under the ASLET initiative, which also aims to attract industry co-funding. ASLET's steering committee — led by representatives of MPA, CSIRO and Singapore's Agency for Science, Technology and Research — held its first meeting at the Singapore Maritime Week 2024 and will issue a grant call to develop a pipeline of projects.

#### Japan's Mol starts operating LPG-fuelled VLGC

Japanese shipping firm Mitsui OSK Line's (Mol) Singapore-based subsidiary Aramo Shipping have started operating a new LPG-fuelled LPG and ammonia carrier for domestic importer Gyxis. The 87,119m<sup>3</sup> very large gas carrier (VLGC) Aquamarine Progress 2 was built by Japanese shipbuilder Namura Shipbuilding at Namura's Imari shipyard in south Japan's Saga prefecture.

The vessel is equipped with a dualfuel engine, which can burn LPG and conventional marine fuel. Mol expects use of LPG to reduce carbon dioxide ( $CO_2$ ) and nitrogen oxide emissions by 20% and sulphur oxide and particulate matter emissions by 90% compared with a heavy oildedicated vessel. The VLGC is also designed to be able to carry ammonia, eyeing potential demand growth for decarbonisation.

Japanese shipping firms and shipbuilders have boosted construction of LPG carriers that can also ship ammonia, as demand for the cleaner fuel is expected to increase in future. Japan plans to co-fire ammonia at coal-fired power plants to reduce CO<sub>2</sub> emissions, while aiming to use ammonia as a hydrogen carrier.

Shipbuilders Kawasaki Heavy Industries and Mitsubishi Heavy

#### **FREIGHT RATES**

POTASH	Price type	Units	Timing	Low	High	Date
Dry potash Vancouver - China 60-65kt	outright	USD/t	prompt	28	30	25-Apr-24
Dry potash Red Sea - WC India 25-30kt	outright	USD/t	prompt	36	41	25-Apr-24
Dry potash Baltic Sea - Brazil 30-40kt	outright	USD/t	prompt	38	55	25-Apr-24
Dry potash Baltic Sea - SE Asia 25-30kt	outright	USD/t	prompt	80	100	25-Apr-24
Dry potash Vancouver - SE Asia 25-30kt	outright	USD/t	prompt	74	76	25-Apr-24
Dry potash Baltic Sea - China 60-65kt	outright	USD/t	prompt	57	86	25-Apr-24
Dry potash Baltic Sea - US Nola 50-55kt	outright	USD/t	prompt	36	54	25-Apr-24
Dry potash Vancouver - Brazil 30-35kt	outright	USD/t	prompt	61	63	25-Apr-24
Dry potash Hamburg - Brazil 30-35kt	outright	USD/t	prompt	23	32	25-Apr-24

SULPHUR	Units	Low	High	Date
50-60kt – Vancouver-China	USD/t	30	33	25-Apr-24
Below all 30-35kt				
Mid East – EC India	USD/t	29	30	25-Apr-24
Mid east – North/River China	USD/t	29	30	25-Apr-24
Mid East – South China	USD/t	24	26	25-Apr-24
Mid East – Brazil	USD/t	28	30	25-Apr-24
Mid East – North Africa	USD/t	36	40	25-Apr-24
Mid East – South Africa	USD/t	24	25	25-Apr-24
Black Sea – North Africa	USD/t	45	65	25-Apr-24
Black Sea – Brazil	USD/t	65	70	25-Apr-24
Baltic – Brazil	USD/t	65	85	25-Apr-24
Baltic – North Africa	USD/t	45	80	25-Apr-24
35-40kt – US Gulf - Brazil	USD/t	26	28	25-Apr-24

Industries each delivered a VLGC, which can carry LPG and liquefied ammonia. Mol, in partnership with shipbuilders Tsuneishi Shipbuilding and Mitsui E&S Shipbuilding, completed risk assessments to design a mid-size ammonia-fuelled ammonia and LPG carrier, targeting to finish construction by 2026.

#### New Texas-Mexico rail crossing proposed

Developers are seeking to build a new rail and highway border crossing between the US and Mexico in Eagle Pass, Texas.

The proposed Puerto Verde Global Trade Bridge would connect Eagle Pass with Piedras Negras, Mexico, on the Rio Grande River. Puerto Verde Holdings said rail and commercial vehicles would be routed away from more heavily used urban centers, allowing freight to cross the border at a faster pace.

The 19-mile-long (31km) Green Eagle Railroad would connect western US railroad Union Pacific (UP) in the US to Ferrocarril Mexicano's (Ferromex) Rio Escondido rail yard in Mexico's Coahuila state. The US Surface Transportation Board on 13 March agreed to consider whether to approve construction of the 1.34-mile US portion of the railroad.

The shortline expects to handle 15-18 trains/day. Beyond securing some UP volume, Puerto Verde wants to develop an industrial park adjacent to the Ferromex yard. It also hopes to develop an aggregates shipping business in Coahuila because local producers do not have rail access. Puerto Verde and UP did not respond to requests for comment.

Eagle Pass is one of the busiest rail crossings between the US and

Mexico. UP already operates a border crossing at Eagle Pass that connects with Ferromex, and western carrier BNSF has trackage rights to operate on the line as well.

That crossing is congested, and demand has outpaced capacity, Puerto Verde said in a petition to STB for permission to build the line.

A nearly weeklong closure of the Eagle Pass and El Paso, Texas, border crossings in December by US Customs and Border Protection to limit migrant crossing resulted in disrupted train movements for several weeks.

UP's Mexico business has been growing steadily. A 4% increase in Mexico rail volume last year boosted revenue from Mexico shipments to USD2.8bn, up from USD2.7bn in 2022 and USD2.4bn in 2021. Last year's volume rose primarily on increased automotive and intermodal shipments but was partially offset by fewer beer shipments.

#### **EPS to register six** ammonia-powered newbuilds with SRS

Shipping firm Eastern Pacific Shipping (EPS) will register six dualfuel ammonia powered vessels, due to be delivered from 2026, with the Singapore Registry of Ships (SRS).

The commitment is part of an initial agreement with Singapore's Maritime and Port Authority (MPA), vessel classification organisation American Bureau of Shipping (ABS) and Lloyd's Register. EPS said the collaboration with the MPA will extend to supporting crew and seafarer training on the vessels powered by "zero and near-zero emission fuels". in addition to pilot trials of these fuels, and building on the capacity and infrastructure required for ammonia bunkering.

Argus assessed the price of green ammonia dob east Asia on a very-low sulphur fuel oil energy density equivalent (VLSFOe) at USD2,608.90/t in March, a premium of over USD1,975.08/t against VLSFO dob Singapore. Grey ammonia in east Asia was assessed at an average of USD829.52/t VLSFOe across March, a premium of USD195.70/t to VLSFO dob Singapore.

#### Saudi fertilizer ship sinks after Houthi missile strike

The fertilizer vessel Rubymar, which was struck by a Houthi-fired missile on 18 February, has sunk in the Red Sea, according to the US Central Command (Centcom).

The British-owned, Belize-flagged Handysize bulk carrier, which was carrying around 21,000t of Saudi fertilizer thought to be NPS, had been slowly taking on water since the attack. An image posted by Centcom showed the vessel listing heavily by the stern.

All crew had been rescued safely and there had been attempts made to salvage the abandoned ship and tow it to Djibouti.

NITROGEN/UREA		Units	Low	High	Date
Middle East - US Gulf	45kt	USD/t	31	33	25-Apr-24
Middle East - Thailand	30kt	USD/t	30	32	25-Apr-24
Middle East - Brazil	40kt	USD/t	22	24	25-Apr-24
Baltic - Brazil	30kt	USD/t	41	47	25-Apr-24
China - India	60kt	USD/t	19	23	25-Apr-24
Algeria - Brazil	30kt	USD/t	25	27	25-Apr-24
Algeria - French bay	12kt	USD/t	23	25	25-Apr-24
Baltic - EC Mexico	30kt	USD/t	47	51	25-Apr-24
Baltic - WC Mexico	25kt	USD/t	76	81	25-Apr-24

PHOSPHATES		Units	Low	High	Date
Morocco – Brazil	30kt	USD/t	23	25	25-Apr-24
Tampa – Brazil	30kt	USD/t	27	29	25-Apr-24
Saudi Arabia – EC India	30kt	USD/t	24	26	25-Apr-24

AMMONIA	Units	Latest	Date
Ras al Khair - Ulsan, 23kt	USD/t	81	26-Apr-24
Ras al Khair - Kakinda, 23kt	USD/t	44	26-Apr-24
Ras al Khair - Kandla, 23kt	USD/t	23	26-Apr-24
Point Lisas - Ulsan, 23kt	USD/t	132	26-Apr-24
Point Lisas - Houston, 23kt	USD/t	35	26-Apr-24
Point Lisas - NW Europe, 23kt	USD/t	57	26-Apr-24
Bontang - Ulsan, 23kt	USD/t	36	26-Apr-24

The vessel departed the Saudi port of Ras al-Khair on 8 February and was bound for Varna, Bulgaria, on the western edge of the Black Sea, vessel-tracking data show. It was due to arrive on 27 February.

The vessel now presents an environmental risk in the Red Sea, said Centcom. The ship, as it sinks, also presents a subsurface impact risk to other ships transiting the busy shipping lanes of the waterway.

#### US rail volume rises on commodities traffic

Most US rail freight volume, excluding coal, rose in March amid signs of a pickup in the manufacturing sector.

Total US rail volume rose in March to 1.9mn units, up by 4.2% from the year-earlier month, Association of American Railroads (AAR) data show.

"Large swaths of rail traffic reflect broader economic changes," AAR chief economist Rand Ghayad said.

He cited the Institute for Supply Management (ISM's) manufacturing purchasing managers' index (PMI) survey's shift into expansion territory in March, saving it "aligns with rail carloads, excluding coal, showing a healthy 2.9% growth."

He pointed particularly to chemicals traffic, which rose by 5.7% from March 2023, as well as petroleum products, up by 15%; and motor vehicles, up by 6.3%.

Economic activity in the US manufacturing sector grew last month for the first time in more than a year, reflecting improved demand and stronger output. The ISM's purchasing managers index rose to 50.3 in March, the first sign of expansion in the sector since September 2022. Readings above 50 signal growth while those below that level signify contraction.

# **Price watch**

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

#### **AMMONIA**

#### Robust demand from the US

The divergence of market sentiment between east and west-of-Suez markets which began to appear in February has grown more pronounced. Those to the west experienced tightness and bullish pricing, while eastern markets were generally well-supplied despite issues at Middle Eastern and southeast Asian plants.

The principal driver of price ideas to the west of Suez in March was a second month of strong fertilizer demand in the US given that its domestic spring planting season is well under way and regional plant outages have tightened supply availability. Problems at Mosaic's Faustina ammonia unit in Louisiana increased its merchant requirement, and gas supply issues in Trinidad limited the country's exports in March. High demand attracted unusually large volumes from across the Atlantic region as north African producers looked to feed the surplus requirement when regional suppliers could not. All of this contributed to a USD30/t gain in the Tampa ammonia contract between Yara and Mosaic for April.

The situation was much calmer in the Middle East and Asia where rock-bottom demand from Indian and east Asian buyers mitigated a series of supply outages to allow for stable to soft pricing over the past month. Sabic expects to bring its Safco 3 unit back on line in early April, as does OQ in Salalah, and maintenance at Pupuk's Parna Raya unit has been completed already. The outages appear to have come at the perfect time to avoid market tightening, and prices have barely reacted.

The regional outlook for the next few months is much more uncertain, however. Ma'aden will take its 1.1mn t/yr MWSPC unit off line in mid-April for repairs lasting at least a month. And this time the outage is likely to coincide with a ramp up in India's import demand as it looks to build fertilizer stocks ahead of the kharif crop season which normally sees peak fertilizer consumption in May to June. The timing and magnitude of India's requirement is the biggest risk factor to our forecast for the next two months. If, as expected, key buyers such as Iffco, CIP and PPL begin buying in earnest while Ma'aden's plant cannot produce, the region will experience some tightening, halting the bear run of the first quarter and prompting some bullish price ideas into May.

We expect that prices have now peaked in west-of-Suez markets given the size of the jump in the Tampa contract.

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Buying demand in the US will begin to draw to a close in the coming weeks as the spring season comes to an end, and with all notable capacity outages addressed, there should be enough supply to prompt a softening in May's Tampa price. European TTF prices have continued to be weaker than expected, allowing most of the continent's producers to operate at their maximum - we do not expect this to change in the coming months, so demand from Europe is doing little to support prices.

Morocco possibly offers the exception to a softer sentiment in the second quarter, as OCP is still buying at high rates to secure its phosphates feedstock. The April lineup stands at more than 215,000t, although much of this has been pushed back from March when bad weather limited the amount that could be unloaded at Jorf Lasfar – up to 100,000t was floating offshore at points in the month. Exporters in the US Gulf should be able to pick up some of the slack once domestic demand recedes, especially once GCA's world-scale plant begins producing – forecast for July, although there is risk to this assumption. On balance, we expect the strong correlation between the north Africa cfr price and the Tampa benchmark to remain in place and for prices to soften from May onwards after an uptick in April prompted by tightness in the Middle East.

Global benchmarks will bottom out in July or August as seasonal fertilizer demand is at its nadir, especially given the timing of new US Gulf capacity and the resumption of some Russian Black Sea exports, which are now expected to begin appearing from Uralchem's Taman terminal in July. As long as supply options remain in place – not a



guarantee after the widespread outages seen in summer last year – a slow accumulation in global pricing will be seen over the second half of the year, peaking in December as the US and European fertilizer applications are at their maximum. There is seasonally little support for prices in the first quarter as most regions are between peak fertilizer application periods, so we forecast quick downwards corrections as we move into 2025 at all major benchmarks.

#### **PHOSPHATES**

#### Indian buyers grind down prices

The phosphate market has undergone significant pricing developments over the past month, both east and west of Suez. Anticipation of Chinese exports returning is weighing on DAP prices in the east, bolstering pricing power for Indian buyers. As the only major DAP market active at present, state-run Indian buyers are pushing for lower prices with each successive deal. The rest of the subcontinent is watching on and is in no rush to re-enter the market.

As a result, Saudi and Chinese prices are expected to soften notably in the coming months, as import economics for the Indian private sector remain unviable and Chinese producers risk foregoing allocated quotas if they are not used, while Saudi prices will be dragged down to remain competitive. It seems almost inevitable that fob prices will decline and reach an Indian breakeven scenario around June, which will support a rise in import demand. After this, price erosion is expected to happen more gradually, until support from tightening Chinese availability in the fourth quarter results in DAP fob prices firming again.

Demand from southeast Asia is largely satisfied for now and Australian import demand has mostly been met. Domestic producer IPL is beginning to look for export



opportunities, increasing available supply further and compounding the downward price pressure in the east.

West of Suez, Morocco's fob DAP price is holding up against the pressure, but we expect that it will start to soften by June. Near-term levels are showing greater resistance than other markets, as supply is focused on lingering European demand that is expected to emerge in the coming weeks once the weather improves. This divergence compared with Saudi and Chinese fob prices is expected to be sustained while ample Chinese supply is fed to the subcontinent, and will last until the fourth quarter. The divergence will also be supported by Morocco shifting away from DAP and refocusing on the Brazilian market, where MAP demand is anticipated to emerge in the coming weeks now that the Australian market has been supplied. Suppliers are temporarily holding MAP cfr Brazil prices, but Russian, Chinese and Saudi suppliers will be eager to target this market, ultimately leading to a sustained global surplus in the coming months and an expected weakening in prices.

US DAP barge prices have contracted significantly as nearterm demand has declined rapidly following wet weather, which has delayed applications. We expect that there is further room for prices to fall, but depleted inventories and continued uncertainty over long-term overseas phosphate supply will keep prices buoyed above international levels. We anticipate a premium returning to the US market towards the end of the outlook period as a result of the country's need to attract supply from further afield.

#### POTASH

#### Brazil has upside as market tightens

Prices globally have been falling but over the past month this trend has transitioned to stability. Lower prices are attracting buyers back to the market but supply is also rising, particularly from Russia and Belarus, and this is keeping the market in balance. In the next quarter price trends differ in different regional markets, but overall we forecast less volatile price movements for 2024 than the previous two years.

In Brazil, prices are rising as the main demand season approaches. Supply is tight as producers have been diverting cargoes to the US in recent months because Brazil has been the lowest-price market for granular MOP worldwide. Imports should increase despite the rising price, as MOP is currently affordable compared with other fertilizers and a strong outlook for the upcoming soybean season should support demand.

The US price by contrast is forecast stable over the next quarter after demand for the spring season has passed, and strong imports in the first quarter have created good product availability that may lead to prices softening.



India is expected to settle a contract for 2024 soon. The government has announced plans to roll over MOP subsidies for the kharif season and India's MOP buying has slowed with limited financial support for farmers. A new contract settlement, expected at USD285-295/t cfr, should increase product flow to the country, but consumption growth from 2023 will be limited regardless.

By contrast, China is unlikely to settle a 2024 contract in the coming quarter. Port stocks in the country have risen towards 4mn t after exceptionally high imports in January, including significant volumes by rail from Russia and Belarus and rising imports from Laos. Demand meanwhile has been weak, even with the spring application season approaching and fertilizer affordability high, which is expected to cause further downward pressure on price in the months ahead, although market liquidity will dip in summer.

The generally soft sentiment extends throughout southeast Asia, with spot prices in the region also gradually falling on limited buyer interest. Pupuk's protracted tender settlement at USD302/t cfr has caused buying to slow over the past month. Suppliers have been reluctant to cut prices significantly with Indian contract negotiations expected, and the hope is a contract settlement that establishes price expectations should see import demand recover. A firm outlook for the CPO price is also favorable for affordability, but this is countered by softer expectations for rice prices and the fact that the rising CPO price outlook is driven by falling production expectations.

Meanwhile in Europe MOP prices are softening. The region still commands a premium to other granular MOP markets as Belarusian and Russian MOP is not available, but this premium is narrowing. Buying has been delayed by poor weather, which risks reducing the application season for Europe this year, further contributing to the soft outlook for price.

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#### **SULPHUR**

### DAP prices expected to fall in third quarter

Global sulphur prices are expected to firm throughout the remainder of April and into May, before peaking and softening from June and through the third quarter as market momentum stalls. Fundamentals driving the near-term price uptick include metals-linked demand from Indonesia and Africa, as well as the ongoing Red Sea conflict and logistical delays through the Panama Canal supporting pricing temporarily. After this slightly firmer period, a softer market sentiment is still expected, with the weaker outlook for short-term DAP pricing expected to filter down into sulphur markets. High freight costs caused by ongoing geopolitical issues are also expected to add downward pressure to sentiment.

Support for the short-term uptick is driven partly by Indonesia's hold on the global nickel market amid historically low prices. The country is maintaining strong sulphur demand, supporting trade to the region. The same applies to South Africa, at copper operations in the Democratic Republic of the Congo (DRC) maintaining rates because of low operating costs. Middle Eastern supply to the Indonesian and South African markets has been secured at firmer prices, supporting the view for further increases in new business. Indonesia's Huayou and Lygend, and Foskor and Glencore in South Africa each took tonnes at higher levels recently. We expect this price run to be short-lived, with demand in other key markets unlikely to keep pace with export availability, and we still expect price erosion to be sustained throughout the third quarter.

The Red Sea conflict and Panama Canal delays initially supported prices because of the elevated freight rates, higher insurance premiums and a lack of vessel availability. Demand remained robust during this period while consumers adjusted to these changes. As demand has eased following the seasonal uplift in the first quarter,



and freight rates remain firm, buyers are unwilling to pay a premium and are withdrawing to the sidelines as spot prices rise, adding pressure to some trade routes. Instead, consumers are drawing on stockpile inventories or using domestic sources to meet demand where possible.

The lack of support from China will be another driver for the softening market in the coming months. While phosphates exports have resumed from the country, DAP demand for high-priced tonnes is low. DAP prices are expected to erode to affordable levels for buyers in key market India because of the government subsidy. Other regions are also facing affordability concerns, with no urgency to enter the phosphates import market. The Argus Processed Phosphates team expects Chinese DAP prices to soften considerably in the short term, adding pressure to the view for sulphur.

The global sulphur trade balance is forecast to remain in surplus over the next 12 months, although there will be several months in which this will move closer to a balance. Underlying bearish drivers will outweigh supportive factors and pressurise prices to a lower footing. In the fourth quarter, we anticipate a slight price increase on the back of seasonal demand amid a forecast uptick in DAP prices in major markets, temporarily providing support. But this will give way to the bearish trend as we enter the first quarter of 2025, driven by the erosion of DAP prices and an increase in new sulphur supply from existing and new capacity, particularly in the Middle East and Asia.

Uncertainties remain that could lead to shifts in pricing over in North America, with the sulphur prilling facility in Alberta, Canada, remaining out of action in April and a timeline for a restart as yet unconfirmed. While Vancouver pricing has stalled in the USD70s/t fob on reduced liquidity and slow demand from key market China, we do expect an uplift in new spot business, in line with international trends through to May. Low prices will remain uneconomical for Canadian sulphur producers, given the cost of logistics and transport, but we would not expect suppliers to turn to increased blocking of sulphur because of this given the pressures to keep product moving to the market.

#### **NITROGEN/UREA**

#### **Record high production rates in China**

Hopes were pinned on the Indian tender in March to bring some stability into the market. But the Indian government's decision to cut initial awards by more than half had the opposite effect, sending prices tumbling.



India reduced awards to 340,000t from 725,000t because of high stocks in the country. These are currently more than 8mn t and forecast to reach over 10mn t by the end of May, approaching 30% of annual usage. Our trade balance now shows a surplus of supply for April climbing through June and July and the price outlook is very bearish.

Global demand proved inadequate to absorb export supply recently. And from May, North American buying will end and China is likely to resume exporting. Attention will turn again to production economics in the swing producing regions — Europe and China — as the main price determinant. Based on prices for natural gas on the Dutch hub for June, the production cost for urea in northwest Europe would be around USD260/t ex-works. This would equate to fob levels of USD220-230/t from north Africa and lower from Russia.

Production costs at Chinese plants vary widely, but taking an average suggests most coal-based units would struggle to make a margin at USD250/t ex-works. This implies prices will have to fall to USD230/t fob or lower to cut supply from the swing producing regions and rebalance the market. Currently prices are heading below USD300/t fob from the Middle East and have a long way to fall to reach these levels.

We believe this will happen during the second quarter, with the decrease likely to happen first from origins that are long for April — notably Russia and some African suppliers — and then more generally for May shipment. Given that the market tends to overshoot, we expect a modest price recovery in the third quarter and early fourth quarter as major demand seasons coincide in the Americas and Europe. But the lower requirement for imported urea in India in 2024 will limit the upside. ■



# Special focus **TECHNOLOGICAL ADVANCEMENTS >**

Fertilizer Focus

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# **Digital applications for** the fertilizer industry

#### Written by

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Fertilizer plants employ a variety of complex process technologies and thus, precise measurement and control of various process parameters is needed to help operators to optimize production and energy consumption.

With the advent of digitalization tools such as artificial intelligence (AI) and machine learning (ML) it has become easy to integrate real-time and historical plant data to provide guidance that helps in reduction in downtime, enhancement of safety and reliability, and reduction in overall material and energy consumption. Digital transformation envisages the application of information technology (IT) or IT enabled technologies (ITES) to advance existing business operations, processes, models, and strategies with the intent of making the company more productive, environmentally sustainable, competitive, and profitable. Areas where digital technologies find direct application for improving productivity, reliability, and safety of plants include facility management, operational efficiency, plant maintenance, corrosion monitoring, data security, turnaround management, and digitization of workforce.

Harnessing the potential of digitalization throughout the industry and achieving consequential economic and other gains is thought of as a means of survival. The performance

#### Even in well optimized plants, there exists ample scope for improvement

related data of the physical assets are collected in in real time and then analysed, visualized, and utilized for taking business decisions that lead to greater efficiency. It uses the power of the industrial internet for enabling sensor guided remote operations, drones for remote data collection, robots for checking integrity of pipelines, cameras for surveillance, cognitive computing for appraisal of exploration blocks, 3D printing for on-demand production of replacement parts and data analytics for supply chain optimization.

#### Facility management

The effective functioning of modern manufacturing facilities involves tremendous planning and scheduling regarding procurement, production, quality control, safety, and environmental care, off sites and utilities, marketing, and logistics besides ensuring optimal use of raw materials, energy, and manpower. We have been using aspect specific systems and tools to address optimization in each of these areas for prudent decision

making to improve the bottom-line. Digitization capabilities help to develop a holistic approach in the above decision-making process. Digital transformation envisages the application of information technology or IT enabled technologies to advance existing business operations, processes, models, and strategies with the intent of making the company more productive, environmentally sustainable, competitive, and profitable.

Major industry segments such as manufacturing of chemicals, power generation, aviation, transportation etc are taking advantage of the new industrial internet of things (IIoT) opportunity to unearth additional value from their operations. Various performance management and process optimization tools employed in the facility generate voluminous data and there has been little effort in the past to holistically review the big data and optimize performance, sustainability, and safety at the enterprise level. The lack of a trusted platform to collate, segregate and analyse data was a major hurdle. The emergence of IIoT resolved this situation and it

has become handy to harness plant data through sensors and derive operational and other benefits including operational excellence, better manpower deployment and utilization, cost reduction, product quality enhancement and better safety and environmental standards.

IIoT safety systems offer early detection of potential hazards and abnormal situations cropping up in plants, send alert notification and prompt stoppages of operations and prevent future accidents by analysing past data collected from plants.

#### **Operational efficiency**

Over the years, the fertilizer industry has witnessed considerable improvement in its operational efficiency. This has been possible because of their timely adoption of innovative and commercially proven retrofit and revamps technologies. Modern managements envision to strategically advance reliability, availability, operational efficiency of manufacturing systems and achieve increased production, yields, and ensure remunerative capacity utilization. With advanced automation, rigorous and real time plant monitoring resulting in optimization of all kinds of resources, better management through effective planning and scheduling become handy. Going further, highly connected open systems with real time domain and instant data integrated with enterprise resource planning (ERP) systems, operators gain command over the increasing complexities in the industry regarding management of difficult to handle upstream, midstream, and downstream operations.

Even in well optimized plants, there exists ample scope for improvement in operating efficiency through the adoption of digitisation and industrial internet of things (IIoT) capabilities. Where to tap for further improvement indeed is a tough task. Technologies continue to develop; operating facilities adopt newer ones as and when they become technically



proven and commercially viable and the operating results in the real-time plant environment follow them. It is exactly within the gaps between these developments lie further scope for optimization. A major technology company through internal studies have shown that 80% of production downtime is preventable - much is due to operator errors. These errors cost the petrochemical industry approximately USD20 bn a year. A welldeveloped preventive maintenance strategy can bring down operating costs which also account for downtime due to unexpected failures by 25%. An advanced predictive maintenance programme with the support of wireless technologies. IIoT and machine learning (ML) and artificial intelligence (AI) enables even greater savings. Under such challenging conditions, there is likely to be a growth of remote operations supported by modern artificial intelligent platforms.

Current developments in wireless technology such as smart sensors, intelligent connectivity, mobile technologies, data storage, analytics and cyber security are increasingly contributing to advance the operability, productivity, maintenance, safety, and environmental stability in the industry. The internet of things intelligently connects physical devices driving improved operating efficiencies, business growth and environment friendliness. Industry engages with the IIoT and uses several sensors of different designs to capture the operating parameters in real time and use the output for decision making to ensure that the operation of the facility adheres closely to the designer's intent and enhance stakeholder value. Connected devices sense operation data and communicate the same to the datacentre where it is analysed with the support of big data analytics, artificial intelligence, and cognitive analysis. The output from the

analysis is developed into actionable programmes to operate the facility in the most optimised manner.

Across the value chain in the fertilizer industry, digitisation and IIoT are engaged to check variation in operating parameters, detect plant and pipeline leakages, monitor catalyst performance and heat transfer efficiency, oversee security and integrity of installations, and check physical condition and location. Real time monitoring of pumping and compressor stations along cross country pipelines help to instantly assess inhibitory factors depressing operational efficiencies and expose corrosion and erosion tendencies leading to failure situations. Precise control of stoichiometric ratio of reactants, control over reaction kinetics and cascading input flows help to improve productivity and thus reduce costs.

In recent years, the industries have been increasingly encouraged to the use of wireless sensor networks and supervisory control and data acquisition (SCADA) for monitoring oil and gas installations. Compared to IIoT, wireless sensor networks (WSN) have limited transmission range, storage capacity and power backup all of which need more improvements. On the other hand, SCADA systems are costly, difficult to maintain and are not scalable. In its place digital twins are capable of multiple access of a wideranging data of several equipment at a time at a lower cost. Thus, IIoT Is capable of addressing the bottlenecks and improve productivity by enabling predictive maintenance in place of preventive maintenance, monitoring changes in operating conditions in real time and reducing downtime due to accidents. The IoT architecture for the above purpose comprises Sensor (smart device), Connectivity to the control centre (gateway) and control centre (server) responsible for application and analysis of data gathered from sensors to generate information and support decision making process for better asset management.

#### In the digital world, data security is a prime consideration

#### **Digital twins**

Digital twins are coming up in a big way in the manufacturing industry offering to increase utilization of capacities, improve product quality and output, forecasting deviations from the designer's intent regarding processes and operating parameters, reduce specific consumptions of energy and feedstock, improve bottom lines, and better workplace safety and achieve environmental targets. A digital twin is a virtual model of an asset (compressor) or process (synthesis), use IoT sensors to monitor and capture data from physical objects, process it in real-time in combination with historical data to provide an elaborate view on the performance of manufacturing equipment and plants. These models are combined with advanced visualization technologies and data analytics to fast-track troubleshooting, forecast imminent failures, and innovate equipment and retrofit the same in an existing facility. Often, a low turn down ratio arising out of overdesign in size and capacity of equipment is a generic problem associated with design. These data driven models in the virtual environment also provide the requisite inputs to better future designs. Digital twins are used in brownfield projects to guide the revamp and modernization of existing facilities to capture better operating efficiencies. A recent Gartner survey suggests that nearly half of all organizations implementing IoT technologies were currently using or were planning to use digital twins. According to a recent research report, the market value of digital twins is estimated to grow from USD3.8 bn in 2019 to USD35.8 bn by 2025. Companies such as Royal Dutch Shell are harnessing the power of digital transformation for over two decades to optimize its operations and drive enterprise-wide performance.

Indeed, a wedding of operational technology (OT) and information and communication technology (ICT) resulting in a saving potential of the order of 25% on avoidable costs.

#### Maintenance strategy

Historically, operators and maintenance men are trained by the original equipment manufacturers (OEM) to maintain its operation as intended by the designer as far as possible. During daily inspection rounds in search of abnormal behaviour of process and equipment and other factors which may run down efficiency of plant operation they list out the immediate as well as long term maintenance requirements. OEMs on the other hand manufacture and deliver equipment with utmost reliability taking into account the facility owner's requirement of balanced throughput, energy efficiency, asset integrity, safety and long service life. Even with a highly optimized design, the shop floor performance of the equipment may experience certain voids needing design improvements or else to be overcome through a modified operating philosophy. Analysis of real time operating data captured by monitoring systems will help the operator to ascertain deviation in machine condition at the right instant, run a software modelling and predict an imminent underperformance or failure.

The shift from reactive ('run to failure') to reliability cantered maintenance (RCM) was gradual and avoided costly equipment failures. Today's pro-active or predictive maintenance programmes use advanced AI-based analytics to identify the predominant factors and monitor parameters to fix variations leading to failures - abrupt or incipient. Moreover, advanced



predictive systems are capable of accurately predicting remaining life of furnace tubes and likely failure time of rotating equipment. This extends equipment service life, avoid expensive repairs, and minimize unscheduled downtime.

#### **Corrosion management**

NACE International puts the annual cost impact of corrosion in the processing industry alone as USD<sub>5</sub>0 bn. A 30% savings on adoption of best practices in corrosion prevention will come to USD15 bn which is significant. Beyond economics, corrosion also adversely affect plant reliability, lead to accidents, damage assets, and spoil the environment. Fertilizer plants are abundantly prone to corrosive effects.

Therefore, early detection of corrosion, its progress, and the impact of the vulnerabilities of varying process parameters must be understood

through advanced monitoring techniques. In fact, we may have to prioritize inspections, strengthen predictive capabilities with regards to corrosion by improving upon data evaluation and better decision making using accurate and real time data.

Most of the present-day nondestructive techniques used in fertilizer plants for corrosion inspection are costly and are likely to invite added risk and downtime. Traditional inspection techniques are built on design data and operating parameters and are likely to evade remote locations such as buried pipes or equipment located in trenches or covered under insulation. Digital corrosion management techniques empower companies to go beyond traditional inspection and maintenance activities to achieve optimum performance across the unit. By using a digitally enabled corrosion management approach, companies



can develop a holistic, proactive, and cost-effective maintenance and inspection plan and strategies for corrosion abatement and inhibition in order to increase watch potential plant sections prone to a high corrosion risk, reduce frequency of inspections and downtime on that account, increase asset value and personal safety.

#### **Data security**

In the digital world, data security is a prime consideration and responsibility of the management. While current operating data is relevant for day-today business, historical data is useful for policy formulation and prediction of price and market trends. Maintaining the confidentiality and integrity of the data control over its access are important from the security point of view. Digitization and encryption help to protect the organization's electronic information systems

from attack of hawkers and prevent unauthorized access. Increased digitization in the oil and gas industry besides improving profitability also raises concerns of cybersecurity risks. Organizations with good governance processes can practice security-by-design — building systems and processes able to respond to unexpected risks and emerging dangers. Employee awareness is also a crucial frontline defence, building cybersecurity consciousness and password discipline to protect against the relentless malware and phishing campaigns.

The EY 20th Global Information Security Survey shows that rising digitization and IIoT are increasing the complexity of the threat landscape. To protect critical information, an organization must not only address the security of the traditional IT and OT environments, it must also deal with the added complexities from the IoT, while also integrating innovative digital business process disruptors, such as robotic process automation, blockchain and artificial intelligence. Never before has it been so important to ensure that security efforts are integrated into every facet of an organization's operations.

EY 'cyber fusion' lists three level of cyber-attacks and suggest remedies thereof. They are the common, advanced, and emerging attacks. The common attacks by hawkers prevented by means of point solutions remain a key element of cybersecurity resilience, with tools including antivirus software, intruder detection and protection systems consistent patch management and encryption technologies to protect the integrity of data, even if an attacker does gain access to it. A prudent threat detection and response capability may be called as a security operation centre (SOC) is an excellent defence against advanced attacks. SOCs are active defence guards – a deliberately planned and continuously executed campaign that aims to identify and remove hidden attackers and defeat likely threat scenarios targeting the organization's most critical assets.

#### Companies need to build agility into their cybersecurity practices

To tackle emerging attacks, such as the rise in cyber-physical threats, in process plants such as the fertilizer facility, companies need to build agility into their cybersecurity practices and approaches so that they can react quickly when the time comes. As cyberattacks and breaches of digitized data are becoming too common the risk of fraud for businesses and institutions is increasing. It could bring potential damage to critical systems and infrastructure such as power generation facilities, process control systems and the sort. Therefore, an effective information security management system (ISMS) is necessary to defend facilities against cyberattacks and other malicious data breaches. The standard ISO/IEC 27001 - Information security management system, provides a detailed framework for the development, implementation, and maintenance of just such a management system. Certification to ISO/IEC 27001 can reduce overall information security risks, ease compliance with applicable security regulations and requirements, and boost the organization's security culture.

#### **Turnaround management**

Turnarounds inevitably contribute to bulk of the downtime in operating plants. Completion of turnarounds without time and cost overruns are dependent on ensuring the right and necessary information, supplies, equipment and manpower at the right time. Therefore, a lot of planning and scheduling is to be done before shutting down a productive plant for purposes of inspection of vessel internals, catalyst change, equipment replacement, cleaning of fouled equipment or hooking up retrofit systems to ensure reliability of plant assets and ward off unexpected failures. Most often turnarounds

incur time and cost overruns due to faulty projections based on inadequate and primitive information about the condition of equipment, delivery schedule of critical supplies, assessment of quantum of work involved and manpower accounted. Today, with the use of artificial intelligence, real time modelling, of maintenance and turnarounds. debottlenecking and troubleshooting become handy and the targets could be achieved almost within the schedule.

The development of app-based software approach is yet another effort to enhance facility safety. Operating personnel exposure to hazardous areas in the plant is limited with the support of wirelessly monitoring process plant data through sensors. Online monitoring of the loss of heat transfer efficiency of heat exchangers, energy and steam loss through faulty traps, predicting end of run of reactor catalysts are well established through app-based software. Abnormal situation monitoring is yet another area where smart wireless devices and sensors enable cloud computing of equipment data in various formats. Overheating, over pressurization and excessive vibration limits are set to identify normal and abnormal operations. In Artificial Intelligence based predictive solutions, deviations from the designer's intent or a set fault threshold initiates warning to alert the operating staff.

#### **Digital workforce**

The fertilizer and downstream industry are widely distributed and engage thousands of workmen to work under varying climatic conditions and hazardous installations. Effective coordination of the workforce at all levels with the objective of achieving greater productivity is a difficult task. Moreover, their safety and wellbeing

(physical and mental) are also a concern. Digital workplace services combining cutting-edge technology and best-in class support services enable the workforce to work from anywhere, anytime and in a secured environment. Digital Communication enabled workforce solutions, planning and prioritizing daily workflows with mobile wearables, IOT and automated AI technologies encourages collaboration among supervisors and workmen and facilitate proactive problem-solving. Skill upgradation of the plant operator to work in the digital environment is also important. **Operator Training Simulators (OTS)** with digital plant modules are used to impart training to the workmen to improve their ability and awareness so that the plant can be operated more safely, faster and in the best manner

#### **Barriers**

reducing downtime to the minimal even in challenging situations.



But implementation of digitalization is not so easy particularly in large, conservative organizations where there is a predominant resistance to change. There are data quality and management issues which needs to be improved over a period. Cybersecurity related risk is a major issue as noted earlier. The cost of transformation technologies and additional investment, sometimes, cannot be justified through the marginal gain accomplished. Shortage of workmen with the requisite digital skills often decelerate the move to go fast on digitization. Lack of industry standards and compatibility issues with partners and customers is yet another problem. These issues can be resolved only with a firm commitment from the top Management of the organization closely aided by an effective

digitalization strategy for success.

The UN climate change conference -COP<sub>26</sub> held in Glasgow UK, exhorted governments, and key decision makers to ensure global temperatures do not exceed 1.5°C above pre-industrial levels by 2050. The use of technology as an integral component of many of the proposed mitigation measures in transitioning to net zero has been highlighted. Within the processing facilities and associated infrastructure management, sensors and actuators are often being used for optimization of production, water and energy management in smart buildings using smart devices. Most of the renowned fertilizer technology providers have already developed and commercialized digital platforms and custom-built software for a comprehensive monitoring of plant and equipment either themselves or in collaboration with major IT and process control leaders. 🔳

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May/June 2024

# New technology for humic fertilizer production

#### Written by

Stanislav Mykytenko, Founder, and Vitaliy Kolesnik, Project manager, GlobeCore, Ukraine

#### Production of humic fertilizers is one of the most promising directions to enhance soil fertility and achieve better crop yields.

There are approximately 3.2 bn hectares of land suitable for agricultural activities worldwide, constituting only 9% of the total land area. However, crop yields are steadily decreasing every year due to violations of scientific principles in agricultural practices, such as crop rotation. The lack production is offset by the application of mineral fertilizers, but they have reached their ecological limits due to soil mineralization. In many countries, restrictions on the use of mineral substances such as fertilizers, particularly those containing phosphorus, are being introduced and gradually strengthened. Therefore, the production of humic fertilizers from organic sources is considered as a partial or complete replacement for traditional mineral fertilizers.

#### **Existing production** methods

Humic substances are formed in soils as a result of biochemical decomposition and transformation of organic residues. Humic compounds accumulate in the soil over a long period of time and play a significant role in determining soil fertility.

'Humic substances' is a general term that includes:

#### Humic substances can exist in the soil without being active

- Humic acids
- Fulvic acids
- Salts of these acids (humates and fulvates)
- Compounds of these acids with soil minerals (humins)

Humic substances can exist in the soil without being active, meaning they do not affect the processes occurring in plants and the soil itself. To activate the beneficial processes, humic substances need to be activated by increasing temperature or using reagents that convert the base substance into a water-soluble state. Only after this process, will the fertilizer become a growth stimulator for plants and a source of nutrients. In addition to their positive impact on plants, humic substances also improve the soil (increasing capillary and field capacity, enhancing water permeability, improving structure and reducing density).

The production of humic fertilizers is not as simple as it first appears. To obtain humic substances from the initial raw material, it is necessary to initially break down the strong lignin and cellulose cell walls. If the breakdown is only partial, no matter which reagent is used, the fertilizer yield will be low. Considering that

the layer of humic substances is not very thick and it takes at least 1-2 years to form it, the efficiency of the equipment used for extraction is a crucial factor.

The simplest process for the production of humic fertilizers is by loading the starting mixture into an extractor, where a solvent is simultaneously added. After some time, the concentration of humic substances reaches the required level, and the mixture is transferred to a distillation tank to remove the solvent. The solvent vapours are condensed in a refrigeration condenser and collected in a special container. The solvent can be reused for extraction. The process is repeated until the desired amount of humic substances is obtained from the raw material. This scheme is not complicated, but it is also not very efficient because it does not break down lignin and cellulose shells, resulting in a low product yield. The process is time-consuming, repetitive, and energy intensive.

For a more efficient extraction, this process can be intensified by using new equipment - electromagnetic devices with a vortex layer of ferromagnetic particles.

#### The vortex layer device

Processing peat, sapropel, leonardite and nanowerm in a vortex layer of ferromagnetic particles is a new method of producing humic fertilizers. This device is shown in Figure 1.

Let us consider the operation of the device using the example of peat fragmentation. In the device, peat dispersion is achieved by the intense influence of ferromagnetic particles moving along complex trajectories under the action of a rotating electromagnetic field. During the movement, the particles come into contact with other peat particles, with each other and with the walls of the working chamber.

Another factor contributing to grinding and dispersion is cavitation, which occurs in the water environment. Under the influence of ultrasound, cavitation (formation and rupture of numerous microscopic bubbles - caverns) occurs in the liquid. When the bubbles burst, energy is released, and the process of peat dispersion in the aqueous solution occurs on a nanoscale until complete extraction of humic acids.

In addition, the following processes occur during the operation of the vortex layer device: grinding of peat with effective destruction of lignin and cellulose shells, diffusion, dissolution of humic substances. and their leaching in the solution. Peat particles are crushed, and more than 80-90% of them have a size not exceeding 15 microns. All processes occur simultaneously, mutually influencing each other, and constitute the extraction process.

The consumption of power by a vortex layer apparatus does not exceed 8.5 kilowatts per hour. The low power consumption is explained by the fact that it is used to induce a rotating electromagnetic field, and the electromagnetic field, in turn, together with ferromagnetic particles, the working chamber, and the processed substances, generates other factors mentioned above,

**Figure 1.** Exterior view of the vortex layer device: (1) protective sleeve, (2) Inductor of a rotating electromagnetic field, (3) Inductor body, (4) Working chamber made of non-magnetic material, (5) ferromagnetic particles





which effectively influence the process of extracting humic substances.

Thanks to this, the vortex layer device stands out favourably compared with other dispersers that are used and have been used to obtain humic fertilizers.

One of the variants of the technological scheme for the production of humic fertilizers using a vortex layer device is shown in Figure 2.

Similar technological production lines for the production of humic fertilizers are already operating and have proven themselves effective in Latvia, The Netherlands, China, and The Ukraine.

The principle of operation of this line is as follows: The raw material, which can be peat, sapropel, vermicompost, brown coal, or leonardite, is precrushed, and then loaded into a hopper. From there, it is fed into the working chamber of the vortex layer apparatus through a vibrating screen by a screw feeder, along with water and reagents. In the working chamber, the humic substances are separated and extracted into the aqueous environment in a matter of seconds. After this process, the finished humic fertilizer is collected in a storage container. The final product has a higher concentration of humic substances and a lower cost compared with fertilizers obtained by traditional methods.

The capacity of such a line with a vortex layer device is up to 1000 litres per hour.

**Figure 2.** Process line for the production of humic fertilizers using a vortex layer device: (1) Feeding and sieving system, (2) Container for preliminary mixing of components, (3) Pump for feeding the product into the working chamber of the vortex layer device, (4) Working unit of the vortex layer device, (5) Control unit of the vortex layer device



# Results of practical application

We obtained samples of humic fertilizers using a vortex layer device. Vermicompost was used as a feedstock for the fertilizer. The results of laboratory tests of these samples are presented in Table 1.

The data shown in the table shows that the humic fertilizer under study meets the requirements for this type of product in terms of complex indicators.

#### **Advantages**

Summarizing both practical experience and experimental results, the use of vortex layer devices in the production of humic fertilizers offers several advantages compared **Table 1.** Chemical compositionof the complex humic fertilizerproduced in the vortex layer device

	Indicator name	Content
1	Fulvic acids, g/l	30.8
2	Humic acids, g/l	19.1
3	Total nitrogen, g/l	2.2
4	Total phosphorus, g/l	2.5
5	Total potassium, g/l	8.1
6	Acidity pH	11.1

with traditional technologies such as dispersers and extractors:

 The device increases the yield of humic acids and fulvoxylates into the solution and enhances their biological activity

- 2. It is suitable for the production of humic fertilizers from any feedstock (peat, sapropel, vermicompost, vermicompost, litter, etc...)
- 3. The resulting fertilizer does not require filtration and does not clog nozzles during spraying due to the grinding of raw materials at the nanoscale
- 4. The device can be operated both in the stream and in the laboratory for experiments on the production of humic fertilizers from new raw materials
- 5. There is lower power consumption no more than 8.5 kW per hour
- 6. It is compact the device does not take up much space and can be easily integrated into existing humic fertilizer production lines for retrofitting. ■



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# New process technologies for sulphur grinding

#### Written by

Hans Kißwetter, Global Manager Agro Chemicals, NETZSCH-Feinmahltechnik GmbH, Germany

The finer the sulphur, the more efficient its effect when used on farmland as a fungicide or as a fertilizer. The very fine breakdown generates a high reactivity of the sulphur, which has the following benefits for the end user:

- Increased profitability through reduction in the amount of product
- High product quality and characteristics adapted to the needs of the end user
- Less environmental impact after treatment
- Management of the farmland is more sustainable in terms of the environment, profitability and safety

For the production of sulphur, a new wet grinding process, consisting of a mixing unit with an agitator type bead mill as pre-mill operating in by-pass mode and subsequent single-pass fine **Versatility:** The process enables grinding with a disc-type agitator bead mill, offers the following advantages over the conventional wet sulphur production processes:

Better quality: The defined stepwise arrangement of pre-grinding in the mixing/dispersing process step and the subsequent wet fine grinding yields a more uniform particle size and thus a higher quality and consistency of the final product.

*Lower energy consumption:* Due to a more effective process design with reduced process equipment and the use of significantly more efficient process equipment, far less energy is used for the production of sulphur suspensions.

#### Far less energy is used in the wet grinding process

Lower dust emissions: The

conventional wet sulphur production process usually requires an upstream dry grinding stage, so wet fine grinding can generally be accomplished more or less satisfactorily.

#### *Higher production capacity:*

Significantly higher production capacities are achieved with a smaller process scope. The materials that are used can be processed faster and more efficiently.

a much wider range of processing of materials, from coarse granules to finely dispersed powders. This significantly increases flexibility in production processes for sulphur applications.

Reduction of cleaning effort and quantities: In general, the cleaning effort is significantly reduced by reducing the scope of the process and by using process-optimized technologies in terms of materials used in process areas, energetically optimized operating principles and optimized design. Less cleaning means using less detergent and ultimately less cleaning waste that is expensive to dispose of.

#### Reduction of maintenance costs:

Using the latest optimized materials with state-of-the-art process units reduces the susceptibility to breakdowns and the wear of the technologies used. This substantially reduces the effort and scope of maintenance measures and the ultimate savings in cost are not insignificant.

#### Dry or wet fine grinding?

Because sulphur in the form of micronized dispersed powder is an extremely reactive element and accordingly poses a very high risk of dust explosion in dry fine grinding processes, very high safety standards must be established to ensure process and operator safety. Therefore, an elementary question for further process designs for the fine grinding of sulphur is whether the product should or can be ground dry or wet.

The suspension concentrate (SC) formulation process consists of a raw material feed station and mixing tank for preparation of the product suspension as well as a grinding stage in the form of an agitator bead mill and a thickening line (see figure 1). This process offers the advantage to

dry fine grinding processes, as they do not require this very complex, continuous process design with regard to dust explosion protection. Only a small manageable area of the initial solids feed step in the mixing system needs to be considered with respect to possible dust explosion protection.

The economic aspect of a production plant plays an essential role. The investment costs for a complete dry grinding plant, including the necessary compressor, dust extraction technology and explosion protection devices are significantly higher than for a wet grinding plant. This is primarily due to the fact, that the wet fine grinding process uses water- or oil-based formulations, which means that there are no longer any explosive mixtures of substances. In addition to the high investment costs, the operating costs of a dry fine grinding plant are also significantly higher than those of a wet fine grinding plant since the efficiency is much lower and the energy consumption is very high.

In addition, end users are increasingly opting for liquid substance systems available on the market because they offer the following advantages:

Better Distribution: Due to their liquid form. SC can be distributed more evenly on the plant surface than dry substances, which are prone to clumping or uneven distribution.

Higher efficacy: Since suspension concentrates adhere better and can be distributed more evenly, their efficacy is often higher than that of dry substances. The active ingredients can thus penetrate the plant cells better and fully develop their effect.

Easier handling: Suspension concentrates are easier to handle and use than dry substances. They are easier to dissolve in water and require no special precautions for storage or handling.

*Less dust generation:* Dry materials can generate dust during application, which can be harmful to both the user and the environment. Conversely, suspension concentrates are dust-free and thus reduce the risk of inhalation.





#### The economic aspect of a production plant plays an essential role

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Fineness progress regarding process phase



May/June 2024



#### New process technology

In wet fine grinding, the agitator bead mill used in the formulation process is the key. Agitator bead mills require a defined raw material quality so that the desired product end quality can be achieved.

For the conventional wet fine grinding process, the sulphur powder from the sulphur dry grinding process usually arrives in a powder quality of d90 = 100-300  $\mu$ m. At this quality, the sulphur is commonly referred to as 'micronized sulphur'. In the subsequent process step of wet fine grinding, a sulphur suspension concentrate is produced, with the addition of thickeners and/or preservatives, in a product quality of  $d_{50} = 1.5 \,\mu\text{m}$ . These concentrated sulphur suspensions are filled in appropriate containers and sent to the end user. There, the liquid concentrate is mixed with water and finally applied

#### The agitator bead mill used in the formulation process is the key

to the fields with special sprayers.

If one considers the extensive process steps described above, starting with the conventional raw sulphur comminution process through the dry fine grinding of sulphur and then the final wet fine grinding, there is considerable potential for savings in the entire process chain, taking into account factors such as explosion protection, health protection, environmental protection, energy consumption, resource consumption and space requirements.

Instead of the complex, dangerous and cost-intensive dry fine grinding process of sulphur, the relatively coarse sulphur lentils or granules (approx. 7-10 mm) through the new

process will be mixed and dispersed in the liquid component using special impact mixing and dispersing tool. After this process step, the particle size in the coarse suspension is approximately 1-2 mm. In a pregrinding stage, with a special type of pre-mill, coupled to the mixing process and running in the by-pass mode, this coarse suspension will then be pre-grounded to a product fineness of  $d_{50} = 30-45 \ \mu m$  (see figures 2 and 3). Compared with the conventional process, where two mills are typically operating in series. Here just one agitator bead mill is used in the subsequent wet fine grinding process step to grind the sulphur suspension finally to the desired end fineness of d50 < 2.5 µm.

#### High speed dissolvers are the most commonly used machines

#### Mixing and dispersing process for sulphur SCformulation

It is possible to mix the sulphur into the liquid using the special dissolver technology in batch operation, equipped with special impact mixing and dispersing tool. During mixing and dispersing, the coarse sulphur is precrushed to a particle size of maximum 1-2 mm.

High speed dissolvers are the most common and flexibly used machines in industry for mixing and dispersing solids in liquids. The speed of the shaft with a new impact mixing and dispersing tool can be adjusted over a wide range of mixing, stirring and dispersing tasks, individually designed for above mentioned product and application.

#### Pre-grinding with the new pre-mill generation

Since the pre-crushed sulphur from the previous mixing process still tends to sediment due to the coarse particles (1-2 mm), a high-performance agitator type pre-mill, which achieves very high throughput rates, is installed directly at the mixer batch tank in by-pass. At the end of the pregrinding process, a product fineness of approximately doo=55µm will be achieved, an absolute stable and homogeneous sulphur suspension.

The key-component of this process step of pre-dispersing/pre-grinding is the use of an agitator type pre-mill. This new pre-milling technology improves the dispersing process in such a way, so that all subsequent production



Impact High Speed Dissolver

steps will benefit from it. The total pre-dispersion time will be reduced by up to 50%. Materials with a tendency toward sedimentation and fluctuating raw materials can therefore be processed without any problems, while ensuring maximum process reliability.

#### Fine grinding with agitator bead mills

An ideal dispersion for fine grinding is obtained when fine dispersed powder is immersed in a liquid layer with a large surface area and when only the

slightest shear stress is required for complete wetting of the solid surface.

An agitator bead mill with intensive grinding system is an absolute necessity for the wet fine grinding processes step. An optimized disc design in combination with a new intensive dynamic separation system ensures maximum throughput rates with a significant narrower residence time distribution, thus a more intensive and energy efficient grinding process can be realized.



# New biotracer sheds light on land-use response to extreme wet weather

#### Written by

James Clarke, Director of Communications, Rothamsted Research, UK

Runoff from farmland is becoming an increasing concern across the UK. In January 2024, severe flooding in many parts of the country merely emphasised what many already know - that we are experiencing more frequent and more intense extreme weather events. For the next few decades, hotter summers and heavier rain are forecast, and that will inevitably lead to more soil erosion as crumbly, desiccated earth is washed into watercourses.

This matters for users of fertilizer. Farmers care deeply about retaining their soils, but rain will also wash any chemicals applied to fields into watercourses, wasting resources and potentially causing environmental problems.

However, the situation is far from hopeless. There are many adjustments that can be made to land use to reduce soil erosion and mitigate field runoff. Predicting how land use changes will affect these processes is complex and the rule of unforeseen consequences applies - seemingly benign changes in one part of a catchment can have serious consequences elsewhere.

Nevertheless, scientists are increasingly confident that new approaches to data collection and landscape modelling can better inform future land-use and management decisions to give us a more robust and resilient countryside where nature, farming, cleaner water and flood protection can all flourish.

#### 'Resilient Farming Futures'

One the most ambitious of these programmes is called Resilient Farming Futures and it is run by

There are many adjustments that can be made to land use to reduce soil erosion

Rothamsted Research from its two sites at Harpenden, Hertfordshire and North Wyke, Devon, UK. The aim is to use sophisticated investigation of runoff and pollution dynamics in landscapes, based on real world data collection, that can rapidly inform farmers and policy makers at all levels about how changes in land use and farming practice may affect our environment.

It makes use of Rothamsted's many long-term data sets, including its grassland research at North Wyke which may well be "Britain's most measured farm". Pretty much every significant resource in and out of the 66 ha instrumented farm and its 120 cows and 360 sheep is measured. At the same time, weather and climate information can be overlaid on this, and combined with other landscape data collection methods, giving a complete picture of what is happening at the landscape level and how changes on the farm affect environmental outcomes.

The team at North Wyke are constantly finding new ways to measure and monitor what is going on in the farmed landscape - and a good example is a novel technique they have developed to work out what fraction of sediment in a watercourse comes from what kind of land use. The process uses plant-derived biotracer compounds as they interact with soil systems. The properties of these differing chemical compounds in a single sediment sample can be measured giving investigators an accurate picture of what fractions of the



in Rothasmted's laboratories

sample come from different land use types, identified by their associated vegetation (woodland, grassland, arable and so on). This, in turn links to a landscape's ability to resist soil erosion.

Scientists using this new tracer have shown, for instance, that cereals dominated arable land contributed over half of all sediments and associated organic matter dislodged by heavy winter rains in a particular watercourse that they monitor in Southwest England. The result confirms fears that, as the severity of wet periods increases under climate change, some current farm practices are accelerating soil erosion and failing to provide resistance to extreme wet weather.

#### So how does the biotracer work?

The study team use carbon 13 (13C) isotopes of dicarboxylic fatty acids (diFAs) as tracers to identify which land uses are contributing to in-

(left) Sediment monitoirng by Rothamsted scientists on the River Taw catchment in Devon: (above) Dr Upadhavav analysing samples

> stream sediments. For the recent study, samples were taken from test sites along an 8km stretch of a catchment in Devon. These molecules are particularly useful as tracers because they are mostly produced by roots and their isotopic signature differs with vegetation. This means that the type of land that sediment has been eroded from can be relatively easily identified using in-stream sediment and source area samples.

Taken over the record-breaking wet winter of 2019/20, the results showed that stream banks contributed most of the sampled sediment in the early winter (October-December) period. In contrast, the dominant sediment source shifted after a period of prolonged consecutive rainfall days in the late winter (January-March) to winter cereals-dominated arable land.

"There is a high likelihood that winter rainfall in South-West England will be more prolonged and



(above) Rothamsted scientists collecting sediment samples in the River Taw catchment in Devon; (right) Runoff monitoring at Rothamsted's North Wyke farm



#### We need to better understand the differing levels of resistance different catchment sediment sources have to erosion driven by extreme wet weather

intense under climate change," said Rothamsted's Dr Hari Ram Upadhayay. "So we need to better understand the differing levels of resistance different catchment sediment sources have to erosion driven by extreme wet weather. This new technique enables us to do that with more confidence."

Sediment fingerprinting using root specific biomarkers is a relatively new approach. The diFAs are a structural component of suberin which is one of the important biopolymers in roots. This acts as a protective layer between root tissues and their environment and contains a high proportion of diFAs which are very stable in soils.

#### **Building resistant** landscapes

Samples were taken of potential sources in the catchment and compared with sediment samples to build up a landscape scale picture of elevated erosion and sediment transfer over the record-breaking wet winter period which was the fifth wettest since 1862.

"There appears to be a high degree of correlation between land use and diFA distribution in soils," said Upadhayay. "This linkage suggests that this technique could become an invaluable tool in accurately identifying what proportions of sediment and associated organic matter come from certain land use types. In turn, this could help

inform land management decisions to build more resistant landscapes to help reduce erosion under current and future climate scenarios."

Professor Adie Collins, co-author on the study paper and leader of the UKRI-BBSRC funded Resilient Farming Futures programme, said, "The new research programme will further explore landscape resilience to weather extremes using a range of tracers deployed in the institute's forensic science toolkit. This will include co-working with the Catchment Sensitive Farming initiative in priority landscapes and with farmer groups where we are training them to deploy elements of the forensic toolkit themselves to support self-monitoring initiatives for water quality."

# **Precision agri-tech could** accelerate uptake of biologicals

#### Written by

Rachel Holdsworth, Director, Holdsworth Associates, UK

The adoption of biological crop protection is being delayed by a regulatory environment that has failed to keep abreast of innovations that would make these products easier and more effective to use. This is according to a new report, 'Precision spraying and biologicals - driving collaboration', which outlines the obstacles to adoption that could be overcome by existing agri-tech, accelerating the uptake of these products.

The pressure to reduce chemical residues left in food products and the environment has made the use of 'biologicals' more attractive to both consumers and retailers. There is also a market push from policy makers looking to reduce the usage of synthetic chemicals. Unfortunately, the regulatory framework is hindering adoption of these novel products.

The report, produced by Agri-TechE in collaboration with Cambridge Consultants, part of Capgemini Invent, draws on the input from leading agronomists. agrichemical providers, formulators and equipment and machinery developers.

"A desire for more sustainable practices in agriculture is driving interest in biological crop protection

#### All plants have an immune system, and if this is primed to expect a pathogen attack then the plant can develop a defence

products, but the perception is that they are more costly to purchase, timeconsuming to apply and less effective than the synthetic equivalents," comments co-author Dr Belinda Clarke, Director of Agri-TechE, a multidisciplinary membership organisation that is facilitating the growth of a global innovation ecosystem in agritech.

However, the contributors to the report considered that most of these concerns could be addressed by recent advances in agri-tech. For example, direct injection nozzles for sprayers will reduce the cost of using biologicals, and robotics are increasing precision.

#### Can regulations keep up?

In many ways regulations are falling behind the science. One of the underlying issues is that the term 'biologicals' covers a broad range of

products - soil amendments, crop protection and biostimulant products, not to mention release of beneficial insects and microbes. Some of these are well proven, such as the use of natural predators for undercover crops, but others have less evidence of efficacy. This generic grouping reduces confidence, which is not resolved by the current system.

"We are stuck trying to fit tomorrow's innovative products into vesterday's regulatory framework," observes Bruce Knight of Legume Technology, developers of microbial inoculants. He explains that if a bacterial product offers plant protection properties, then to promote this action it needs approvals in the same way as a synthetic fungicide, because the classifications have not been updated.

Biologicals have a different mode of action, and smaller amounts of the active ingredient are required. They



(above) Bayer's Better Life Farming initiative aims to support smallholder farmers in developing economies. One of its partners is Verdesian Life Sciences, a developer of technologies including biostimulants to support nutrient use efficiency. *Image credit: Bayer AG; (right)* Insects use pheromones to communicate, so synthetic pheromones can disrupt mating and lure pests away from crops. They can also be used in traps to provide early alert of pathogen risk. *Image credit: PheroSyn* 

are often applied as a prescription, which requires regular monitoring and multiple passes of the crop.

"Recent innovations in precision agriculture more easily enable 'per row' and 'per plant' application costeffectively within stringent spraying conditions," Dr Clarke continues.

"Unfortunately, the regulatory environment has not kept up and is still centred around the 'number of applications' instead of the 'total amount' of active ingredient used across the field, and this is hindering developments."

#### **Nutrient absorption**

Existing spray equipment is able to apply product according to a map, and record exactly what was applied, and where it was applied

- if used effectively this automated functionality could facilitate a change in regulations.

Dr Clarke says that such a change would incentivise the targeted application of all plant protection products, reducing the impacts on the environment.

Although reducing passes over the field is desirable, with the development of 'green machines' and automation this is becoming less of an issue.

Current precision sprayers are designed with finer nozzles to enable lower volumes of smaller particles at high pressure. Typically, biologicals are large particles and living organisms, so shear damage needs to be avoided.

To develop nozzles optimised for biologicals requires there to be a

sufficient market. If there is too much variation in the products, the size of the opportunity will be impacted.

A change in the regulatory environment would also enable business model innovation.

Many biologicals are not in themselves sources of nutrition. Instead, they work with the crop to enable the capture and absorption, from both soil and water, of essential nutrients that would otherwise be inaccessible. Newer inoculants take this to the next level by switching on and off the crop genes that influence nutrient absorption.

#### Fast-track innovation

As understanding increases of the microbiome and its influence and interrelationships with the crop new

#### The future of farming will be enabled by the combination of data-driven insights



(left) PfBio is using naturally occurring and beneficial soil bacteria to suppress plant diseases. This type of 'biocontrol' is achieved by identifying varieties of the bacteria Pseudomonas that associates with a particular crop and boosting its presence, so it outcompetes the pathogen. *Image credit: PfBio*; (right) In sub-Saharan Africa, where Legume Technologies has been involved for more than 15 years, the use of inoculants has been shown to help smallholder farmers double their yield. *Image* credit: Holdsworth Associates

technology platforms will emerge. To convert this into commercial products and services will require a multi-disciplinary approach, with codevelopment of solutions by players with different specialisms.

There are some examples of effective collaborations, for example the recent announcement in January 2024 by John Deere and Corteva,

which will be key for increasing innovation in this space, allowing more growers to move to use biological products without completely disrupting current practices.

A press announcement about the collaboration included comment that "the future of farming will be enabled by the combination of data-

#### About Agri-TechE

Agri-TechE is a business focused membership organisation that supports the growth of a world-leading network of innovative farmers, producers, scientists, technologists, and entrepreneurs who share a vision of increasing the productivity, profitability, and sustainability of agriculture.

*The report 'Precision spraying and biologicals – driving collaboration' is available at:* www.agri-tech-e.co.uk/precision-agri-tech-could-accelerate-uptake-of-biologicals

driven insights and science-based agronomic recommendations that are precisely executed by connected and increasingly intelligent machines."

Dr Clarke concludes: "The industry urgently requires a more collaborative approach between formulators, equipment developers and regulators to fast-track innovation."

#### **Conference preview:**

# **Argus Clean Ammonia North America**

12-14 June 2024 • Hyatt Regency Galleria, Houston, Texas

#### Meet market makers and explore the commercial future of clean ammonia in the Americas

#### Carbon and CCS workshop | Regional highlights | Unrivalled networking opportunities

The Argus Clean Ammonia North America Conference will be returning for the second time to Houston, Texas, from 12-14 June 2024. With a new venue and a revamped conference program, three days of networking and exclusive insights await our 200-plus attendees from more than 100 companies.

The Inflation Reduction Act announced in 2022 transformed the project landscape for global clean ammonia production. The event will provide critical updates on its progress and the extent to which it is succeeding in driving supply and demand for hydrogen and ammonia in the US.

The event brings together delegates from across critical value chains in the energy transition, including those from the critical energy hub in Houston, as well as key fertilizer and other hard-to-abate sector leaders. Hear from senior industry leaders from key US states such as Texas and Louisiana, as well as from Canada, Europe, Japan and the rest of the world.

Among these topics, the conference has a new addon, the Carbon and CCS Workshop, which will enhance your knowledge and business partnerships, given the importance of blue ammonia for kick-starting carbon emissions reduction journeys.



#### Agenda highlights **Carbon and CCS Workshop**

A new add-on to the conference that explores carbon and CCS. Do not miss this opportunity to gain insights into blue ammonia production projects, carbon storage challenges, CCS technology developments and so much more. The objective of this workshop is to provide attendees with insights and connections related to this critical element of the market.

Hear from CCS and blue ammonia industry leaders on their perspectives of the role that CCS will play in the future as demand for low-carbon ammonia ramps up globally.

#### Featured speakers include:

- Faisal Mohmand, President, Bechtel Energy Technologies & Solutions
- Tobias Birwe, Head of Sales, Fertilizer and Methanol, Thyssenkrupp Industrial Solutions
- Jessica Campbell, Director, Asset Innovations, ClimeCo
- Nick Kapur, Vice-President, Energy Transition, Argus
- Ning Lin, Chief Economist, Bureau of Economic Geology

#### Main conference sessions

Over the course of the three-day conference, the big questions facing many producers will be hotly debated, including where demand for low-carbon ammonia is emerging. Further topics for discussion will include midstream infrastructure development in North America, certification requirements in line with global subsidy schemes and their role in making clean ammonia a fungible commodity. Explore our agenda online: https:// www.argusmedia.com/en/events/conferences/cleanammonia-north-america-conference/agenda

#### Featured speakers include:

• Amit Goyal, Regional Head, Hydrogen and Low Carbon Fuels, North America, DNV Energy



- Jakob Krummenacher, Vice-President of Clean Energy, LSB Industries
- Navid Ostadian-Binai, Head of Green Vessels and Fuels, Maersk Tankers
- Olivia Barnes, Head of Low Carbon Commodities, EnBW
- Wim Dillen, International Development Manager, Port of Antwerp-Bruges

#### Network and develop key partnerships and conversations in North America

With more than 200 attendees, this conference provides you an opportunity meet with potential business partners across the ammonia and cross-sector value chains in the energy transition, including our NEW Women in Ammonia breakfast, welcome drinks, coffee breaks, lunches and evening drinks reception.

*Discover more and secure your place at:* https://www.argusmedia.com/en/events/conferences/ clean-ammonia-north-america-conference/registration

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# **Measuring fertilizer** consumption progress in Africa

### Moving from the Kg/Ha indicator to more comprehensive datasets

#### Written by

Sebastian Nduva, Lead, Africa Fertilizer, Africa Fred Gyasi, Deputy Program Manager, Africa Fertilizer, Africa Ousmane Kone, VIFAA program manager, Development Gateway, Africa and Scott Wallace, CEO, Wallace and associate, US

The average fertilizer usage in Africa has seen a rise from 8.0 Kg/Ha in 2006 to a peak of 42.5 Kg/Ha in 2019, followed by a downward trend to settle at 34.5 Kg/Ha in 2022 amid the recent fertilizer crisis with rising prices and limited availability. When looking at the positive increase in fertilizer use over the past decade, the goal of 50 Kg/Ha, as stated in the Abuja Declaration signed during the first Africa Fertilizer Summit in 2006, seems within reach. However, when looking at country usage, the differences are huge. For example, data recorded for 2020 shows an average of 401.2 Kg/Ha for Egypt, 5.6 Kg/Ha for Guinea, 14.4 Kg/Ha for Tanzania, and 79.0 Kg/Ha for Zambia.

National averages can be deceptive though, because they do not give any information on the geography or crop use and product versus nutrient content. To get the full picture of what is happening in the fertilizer sector, we need to look beyond fertilizer consumption in Kg/Ha, which has

#### The Abuja Declaration

The Abuja Summit resolved under a 12-step resolution, to provide a mechanism for increasing fertilizer consumption in the continent to leapfrog the green revolution in Africa. Under this declaration, it was hoped that the various interventions resolved would incentivize the fertilizer adoption rates in the continent subsequently increasing productivity and improving livelihoods.

been regarded since 2006 as the indicator of all indicators. Since 2009, the International Fertilizer Development Center (IFDC) and partners have been tracking 18 fertilizer markets using different indicators. The collected data provide a wealth of information for policy makers and the private sector and gives a much more complete picture than the Kg/Ha indicator. Let us have a look at what has been done so far, what actual progress has been made, and why continuous data collection is needed from all African countries.

#### The indicator of all Indicators

The Abuja Declaration of 2006 established kilogrammes per hectare (Kg/Ha) as the primary indicator to measure progress in the fertilizer sector across African Union Commission (AUC) Member States. This indicator, also known as National Average Fertilizer Consumption, offers insight into a country's fertilizer usage and its impact on soil health and agricultural productivity. However, collecting accurate data for both the numerator (total fertilizer consumed) and denominator (arable land utilized) presents challenges. Even with precise data, the Kg/Ha indicator alone doesn't provide a comprehensive understanding of the fertilizer sector.

Determining the numerator (total fertilizer consumed) presents its own complexities. When discussing fertilizer, do we refer to the entire product or its nutrient content? For instance, a 50 kg bag of fertilizer might contain a much smaller weight of nutrients. Consider NPK15-15-15, which signifies 15% each of nitrogen (N), phosphorus (P), and potassium (K), totalling 45%. While the bag weighs 50 kg, the nutrient content is only 45% of this weight, equating to 22.5 kg. Therefore, accurately assessing fertilizer consumption requires distinguishing between total product weight and nutrient content.

Even if we agree to use the nutrient content, a second issue presents itself. Since it is not feasible to carry out extensive farmer surveys on previous seasons' consumption, we need to rely on other sources to get an idea of the national fertilizer consumption. To get an accurate number, we need to look at how much fertilizer was produced domestically, how much was imported, how much was exported, how much was consumed during the year, as well as the amount that was held in storage for the next farming season. Another critical missing piece would be fertilizer traded through informal channels across borders. In most instances there is no way to capture this. Where the above data exists, at best, it is highly disaggregated; the government, fertilizer manufacturers, importers, distributors, customs, revenue authorities, plantations, and cooperatives all have a piece of the information. Thus, fertilizer consumption data must be triangulated and validated from multiple sources.

On the other hand, determining the denominator (Ha) for arable land utilization faces several challenges. These include confusion between hectare and acre measurements and farmers' lack of knowledge about their land size. Additionally, the term 'arable' excludes perennial

#### Determining the denominator for arable land utilization faces many challenges

crops like cocoa and fruit trees, further complicating data collection. While the indicator may seem straightforward, its interpretation and data collection present significant complexities.

#### The importance of accurate Fertilizer demand and and complete data

Why is it so important to have accurate data, and why is a rough estimate of Kg/Ha not enough? A first reason can be found by simply looking at the metric. In most regions of the world, the average Kg/Ha is in the triple digits. For example, in 2021, according to the World Bank, the average fertilizer use for The Netherlands is 274.4 Kg/Ha, for Brazil 369.5 Kg/Ha, India 193.2 Kg/Ha, and 128.7 Kg/Ha for the US. However, the average Kg/ Ha indicator in most sub-Saharan countries does not reach above levels. In 2020, only Egypt and Mauritius recorded an average use of triple digits, while Central African Republic, DRC, The Gambia, Namibia, and Niger all remained under the 5 Kg/Ha. If the accuracy is off by 4 or 5 Kg/Ha, this will have little relative impact for most of the world. However, in sub-Saharan Africa, such an error rate translates to significant impact.

Accurate data is crucial for various stakeholders, including both the public and private sectors in African fertilizer markets. Governments, as major buyers, rely on data to ensure food security by avoiding fertilizer supply shortages and agricultural production shortfalls. Reliable data enables tracking progress against fertilizer goals and adjusting policies accordingly. For the private sector, accurate information is vital for planning procurement and imports for the upcoming season. Data inaccuracies can lead to over-supply, storage challenges, or under-supply,

impacting yields and threatening farmers' livelihoods and food security. Additionally, incorrect data can result in delayed procurement decisions, affecting timeliness in some African countries.

# distribution

Even with accurate Kg/Ha data, the indicator falls short of providing a comprehensive view of the national fertilizer sector. While it offers insight into fertilizer consumption, it doesn't capture demand or distribution patterns. Achieving a target of 50 Kg/Ha may not necessarily meet the actual fertilizer demand, which could be higher. Moreover, disparities in usage across regions or crops can skew the average, masking potential shortfalls or inefficiencies. Without information on geographical and cropspecific distribution, both the public and private sectors face challenges in identifying unmet demand and strategizing effectively. A lack of a complete picture hampers planning and decision-making efforts.

The importance of having a complete picture extends beyond the national level to the regional level, as recent events, such as the fertilizer shortage due to the conflict in Ukraine, have underscored the interconnectedness of global markets. In Africa, where some countries are fertilizer manufacturers and others have untapped production potential, understanding regional demand is crucial for attracting investment. Investors need assurance of demand not only in existing markets but also in regions with low fertilizer usage. A comprehensive understanding of regional dynamics enables stakeholders to unlock market potential and promote sustainable growth across the continent.

#### A more complete dataset

Does that mean that the Kg/Ha indicator is completely useless, and we should no longer use it? Not at all; The Kg/Ha indicator remains valuable, but its definition needs clarification. While it provides a useful snapshot of national fertilizer consumption, relying solely on this indicator is insufficient for gaining a comprehensive understanding of the fertilizer sector. To make informed decisions, we require a broader range of fertilizer statistics at the country level, including production, trade, distribution, prices, production capacities, and crop-specific fertilizer use. Moreover, data collection efforts must encompass all African countries to ensure inclusivity and accuracy. While acknowledging the benefits of more extensive data, we must also recognize the challenges involved in collecting it. Balancing the need for comprehensive information with practical data collection methods is essential for effective decision-making in the fertilizer sector.

In 2009, IFDC, in conjunction with the International Fertilizer Association (IFA), started the AfricaFertilizer initiative to address gaps in fertilizer data on availability and market information in sub-Saharan Africa as part of the effort to increase fertilizer nutrient use to 50Kg/Ha. In 2019, AfricaFertilizer joined forces with Development Gateway: An IREX Venture with Wallace & Associates under a programme dubbed Visualizing Insights on Fertilizer for African Agriculture (VIFAA), funded by the Bill & Melinda Gates Foundation. The partnership has been crucial in ensuring that data from both the public and private sector are brought forward and reliably sourced.

In November 2022, AfricaFertilizer launched a harmonised web-based platform (www.AfricaFertilizer.org) which integrates country-specific dashboards as well as fertilizer data on trade, production, consumption, and retail prices for 18 countries across sub-Saharan Africa. The new data allows for easier comparative analysis across countries. Users in the public sector

#### Fertilizer Technical Working Group (FTWG)

AfricaFertilizer collects data from different sources on fertilizer trade. production, and non-agricultural usage to approximate the apparent consumption of fertilizer by farmers in countries. Apparent consumption is calculated as:

#### Production + Imports – Exports – Non fertilizer use of Imports

To obtain a more accurate estimate, we also subtract the carryover stocks for the year. By relying on trade data, we gain valuable insights into the fertilizer market, including the types of fertilizers imported, the countries they come from, and the timing of fertilizer imports in the country.

Next, the multisource data is reviewed and validated during FTWG workshops facilitated by AfricaFertilizer. In these workshops, key fertilizer stakeholders from the public sector (the Ministries of Agriculture, Customs, Research Institutions, CountrySTAT), the private sector (fertilizer blenders, producers, suppliers, importers, and exporters), technical partners, donors, and civil society organizations participate actively to review and validate the country's fertilizer data.

The main objective of processing, cleaning, and validating fertilizer data is to assess and comprehend the true amount of fertilizer used by farmers for agricultural purposes. At the moment, this process is followed across 18 selected African countries, including Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal, and Togo in West Africa, and Burundi, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, and Zambia in East and Southern Africa.

#### Data collection is costly and takes lots of efforts from different stakeholders

use the data to track progress against fertilizer goals or adjust policies and create incentives for actors in the supply chain as needed. The private sector applies this information to better plan procurement and imports for the next agricultural season. The data analytics behind these dashboards is collected through a Fertilizer Technical Working Group (FTWG), convened and hosted by IFDC.

#### The way forward

Data collection is costly and takes lots of efforts from different stakeholders. The efforts by AfricaFertilizer is a major step in the right direction, but we are not there yet. Data can change overnight which means that data collection work is never finished.

Moreover, at the moment, the webbased platforms depict data from 18 sub-Saharan African countries only, as can be seen in the map below. Data is needed from other countries in the region to unlock any potential demand and raise the interest of the private sector to invest in supplying and distributing fertilizers to those countries. Data from additional countries can help to align policies across the region and identify possibilities for domestic fertilizer production.

Using the Kg/Ha indicator was a nice start, but it is not the silver bullet to develop the fertilizer sector and ensure food security. It is time to move to a more comprehensive set of data, and not just from a few countries, but from every country in sub-Saharan Africa.





#### Using a comprehensive data set in practice: The case of Kenya and DRC

To understand the need for a complete dataset, let's look at some data of Kenya and the Democratic Republic of Congo (DRC). Data from Kenya shows that fertilizer consumption has slowly increased over the past decade with peaks in 2013 and 2017 (see figure 2).

The same graph for DRC, a country four times the size of Kenya, looks completely different, as can be seen in food crops and 20% for cash crops. figure 3.

In DRC, the fertilizer consumption remains under the 2 Kg/Ha. Any margin of error, even of half a kilo, has large implications for the indicator. Therefore, the data cannot provide adequate information to inform and support decision makers (both private and public).

In addition, Kenya has data indicating that 80% of fertilizers are used for

This will help the Government of Kenya to make decisions with regards to food security and/or export of crops. For DRC, that data is not available. Kenya also has data on fertilizer prices, fertilizer use per crop, quantities imported, the number of importers, and distribution of fertilizers. Kenya historically has supported agriculture data which allows for more informed decision making for all.

# Soil values in West Africa

### Sustainable management of soil fertility and agricultural resilience

#### Written by the International Fertilizer Development Center (IFDC):

Alimata Arzouma Bandaogo, Deputy Program Director, Technical, Soil Values Program, Burkina Faso Mariano Dossou-Kpanou, Corporate Monitoring, Evaluation, and Learning Coordinator, Benin Olga Kokode, Regional Communications Coordinator, Benin Evariste Léon Gbaguidi, Communication Specialist, Soil Values Program, Niger and Diro Bénoit Wilfried Toe, Senior Communications Coordinator, Soil Values Program, Burkina Faso

Soil degradation has a considerable impact on agricultural productivity in West Africa. It is mainly linked to two factors: one associated with climate change and the other linked to anthropic factors (expansion of crops, poor cultivation practices and overgrazing). This is a worrying situation, as communities in West Africa already struggle daily to feed themselves.

Several initiatives have been developed through agricultural policies and resilience and food security programmes such as West Africa Food System Resilience Program (FRSP), Agricultural **Resilience and Competitiveness** Project (PRECA) and the Regional Sahel Pastoralism Support Project (PRAPS) seek to achieve food security for populations in a context of climate change. However, the agricultural sector continues to face many challenges linked to the sustainable management of soil fertility and soil health. Soil Values aims to provide solutions through synergies with existing programs and a community-based approach at watershed scale. The programme aims to sustainably improve soil fertility to increase food production and strengthen the resilience of

agricultural producers in the face of climate change by promoting sustainable approaches and technologies.

#### Challenges to food security and smallholder resilience in Africa

According to estimates presented in the most recent edition of The State of Food Security and Nutrition in the World, published in July 2022, the number of undernourished people in the world increased to 828 mn in 2021. Smallholders, whose resilience has been tested by multiple shocks, are particularly vulnerable. In Africa, 70-80% of them rely on agriculture and renewable natural resources for income, employment, food, nutrition, and overall well-being. Humaninduced degradation affects 35% of agricultural land (1,660 mn hectares), and a fifth of the land degraded by human activities is in sub-Saharan Africa.

An invaluable resource, soil is the foundation of agriculture, livestock farming, ecosystems, and livelihoods. The sustainable use of this potential promises to transform the future of the region, where food scarcity is

giving way to increased agricultural productivity and greater household resilience.

According to FAO STAT 2022 data, soils are the basis to produce over 95% of our food. Healthy soils store the largest quantities of fresh water, nutrients, and carbon of any biome, with interactions between plants and microbes facilitating the absorption of water and nutrients needed for plant growth. All these elements are conducive to enhancing soil fertility and boosting agricultural production in the Sahel.

Low agricultural productivity can be attributed to several factors, including soil degradation, the small size of farms, and the use of rudimentary technologies. A range of innovative technologies has been developed to manage soil fertility, improve systems, and increase farmers' resilience. However, the agricultural sector in Africa is slow to meet the growing demand for food. Many questions are being asked about the catalysts that need to be activated, the synergies that need to be created between agricultural programmes, and the players that need to be involved to achieve real development in the agricultural sector.



#### Supporting farmers in improving soil fertility

The lack of nutrients and the use of organic and mineral fertilizers have affected soil health, agricultural productivity, and the region's economic transformation. Decision-makers and ministers of agriculture and finance met in Lomé, Togo, on 30-31 May 2023, for a high-level round table organized jointly by the Economic Community of West African States (ECOWAS) and the Togolese presidency, with the support of the World Bank Group and the International Fertilizer Development Center (IFDC).

At the end of the meeting, industry leaders and development partners of the Regional Agency for Agriculture

and Food in West Africa (RAAF) reaffirmed their support for an innovative and integrated approach to sustainable soil fertility management. The regional leaders approved a declaration covering a series of concrete objectives and measures, including urgently improving access to mineral and organic fertilizers for small-scale farmers, with a focus on climate-resilient crops to ensure food security for the region's inhabitants. A second approved objective is to strengthen research and development systems in the field of sustainable land management, including through the adoption of new technologies.

Commenting on the role of fertilizer in soil fertility, President of Togo Faure Gnassingbé said, "Without a vision

and a strategy, fertilizers quickly go from promising to restore the soil to causing it to deteriorate. Given the need to strike the right balance, government planning and involvement are essential. That's why I'm in favour of regional planning."

According to a press release published on the World Bank's website on 11 January 2021, the organization plans to commit more than USD5 bn to the development of the agricultural sector. This involves continued support for the reforms needed to improve soil health and strengthen the fertilizer sector in terms of subsidy management, quality control, and traceability through development policy operations and green fertilizer production projects.

#### Soil Values will strengthen financing of input value chains

The Netherlands Directorate-General for International Cooperation (DGIS) has launched the Soil Fertility Grant Program (SFGP) to support initiatives on sustainable soil fertility management and contribute to ecologically sustainable improvements in food productivity and increased resilience of small-scale food producers in the Sahel.

#### Soil values, a major soil fertility management programme in the Sahel

Soil Values is a programme funded by DGIS to support farmers in adopting sustainable soil fertility management practices in the Sahel. Over the next 10 years, the programme will seek to improve the fertility of 2 mn hectares of farmland and enhance the production capacity and resilience of 1.5 mn farmers in four Sahelian countries: Burkina Faso, Mali, Niger, and northern Nigeria.

The Soil Values programme focuses on the adoption of an Integrated Soil Fertility Management (ISFM) approach within a participatory landscape management framework. This initiative aims to stimulate sustainable profitability assessments and promote the widespread adoption of proven technologies and methods. ISFM generates productivity gains, increased resilience, and mitigation benefits. It utilizes a set of practices related to fertilizers, organic resources, and other amendments on smallholder farms to increase production and input use efficiency.

Emphasizing the need to value soil fertility, Dr. Bidjokazo Fofana, Director of IFDC's Soil Values programme stated, "Neglecting soil fertility risks



The use of fertilizers is a key aspect of ISFM. Nutrients must be added to a cropping system to compensate for the removal of nutrients in the form of harvested produce

compromising the ecological balance and degrading forest ecosystems. In addition, excessive fertilizer use can lead to groundwater pollution. affecting downstream communities. Despite its crucial role as the source of all production, soil lacks direct monetary value, which does not reflect its true importance."

Soil Values will strengthen financing of input value chains, primarily through synergies with the African Fertilizer Financing Facility (AFFM) established by the African Development Bank (AfDB) and in collaboration with the fertilizer industry and the financial sector, which will facilitate the guarantee of commercial credit. Subsequently, Soil Values will support the delivery of inputs and training of all actors in the fertilizer value chain.

#### **Development partners**

According to a publication on ECOWAS's website from 31 May 2023, the RAAF reported that the kingdom of the Netherlands has announced EUR100 mn to support the fertilizer sector in West Africa over the next decade. Soil Values intends to guadruple this budget by attracting more than EUR100 mn from development partners, more than

EUR100 mn from the private sector, and more than EUR100 mn in funding from the fertilizer sector to improve soil fertility in the Sahel.

For its actions to be relevant, Soil Values needs to work with the ministries responsible for agriculture, the World Bank's West Africa Food System Resilience Program (FSRP), and other local projects and programmes working on agricultural resilience in West Africa. These include the Toward Sustainable Clusters in Agribusiness through Learning in Entrepreneurship (2SCALE) programme, the Feed the Future Enhancing Growth through **Regional Agricultural Input Systems** (EnGRAIS) project for West Africa, the Fertilizer Sector Reform Support Project in Niger (PARSEN), and the Integrated Seed Sector Development in the Sahel (ISSD/Sahel) project.

Soil Values is implemented by IFDC in collaboration with lead partners SNV and Wageningen University and Research (WUR), as well as other research and development organizations such as AGRA, World Agroforestry (ICRAF), the International Institute of Tropical Agriculture (IITA), ISRIC – World Soil Information, and the International Water Management Institute (IWMI).

# **People and events**

# Nadja Håkansson appointed Chief

YCA-team, I am confident that Hans Olav will support and lead the company to the next level, spearheading the **Executive Officer of thyssenkrupp Uhde** rapidly growing clean ammonia business, says Magnus thyssenkrupp has announced the appointment of Nadia Krogh Ankarstrand, EVP Corporate Development in Yara Håkansson as the company's new Chief Executive Officer of International. Ankarstrand will continue as Chairman of thyssenkrupp Uhde. the Yara Clean Ammonia Board.

"We are delighted to welcome Nadja Håkansson to thyssenkrupp Uhde as the new CEO," said Miguel López, CEO of thyssenkrupp AG. "With an extensive background in the energy technology industry, Nadja brings a wealth of experience and leadership to thyssenkrupp Uhde to position the company as an enabler of the industry's transformation towards further CO<sub>2</sub> emissions reduction."

"thyssenkrupp Uhde has significant potential for shaping the green transformation in our industry, and I am honoured to lead this prestigious company as we embark on this exciting journey together," said Nadja Håkansson. "I am looking forward to being part of thyssenkrupp Uhde's engineering competence, to fostering a culture of innovation and to delivering sustainable value to our customers & stakeholders."

The future CEO of thyssenkrupp Uhde, Nadja Håkansson, has held various management positions at Siemens and Siemens Energy and looks back on over 18 years of national and international experience in the areas of supply chain management, operations, sales and corporate management. Most recently, as Senior Vice President Region Africa for Siemens Energy, she was responsible for the company's overall portfolio development in the African market. Nadja holds a Master of Science in Industrial Engineering and Management from the Institute of Technology at Linköping University, Sweden.

#### Hans Olav Raen is appointed CEO of Yara Clean Ammonia (YCA)

Mr. Raen has until now been Business Director and heading OCI's fertilizers business in Europe. He has more than 25 years of experience in the fertilizer industry, including twelve years with Norsk Hydro and Yara International (between 1997 and 2009), where Mr. Raen held commercial and managerial roles in Europe and Africa.

Hans Olav Raen holds a master's degree from the College of Europe as well as a degree in digital leadership from the ESSEC Business School in Paris.

- We are pleased to announce that Hans Olav will be heading Yara Clean Ammonia. Together with the strong



#### Hy2gen welcomes Astrid Hartwijk as **Chief Operating Officer**

Hy2gen, the global developer, financier, builder, and operator of plants for the production of renewable hydrogen and hydrogen derivatives, is very pleased to announce the appointment of Astrid Hartwijk as Chief Operating Officer. Hartwijk has over 25 years of experience with international companies in the energy sector.

"I am thrilled to join Hy2gen. I had open and very assuring conversations with the other Board members. Cvril Dufau-Sansot and Bernd Hübner, which gave me the feeling that we can work well together as a team and that I can contribute a lot at Hy2gen. The level of professionalism, what Hy2gen stands for, and the type of investors behind it; everyone is on the same mission to combat climate change by providing renewable fuels", says Hartwijk of her new role, adding: "It's a fantastic team here at Hy2gen. Working and discovering things together with a diverse group of enthusiastic people, that's what I'm looking forward to the most. My task here will be to move projects from the development stages into reality with speed, focus, and sound business cases. To do that we will need to navigate the still developing regulatory landscapes, markets, and supply chain challenges."

Hartwijk has a degree in chemistry and many years of experience in project management. Her career highlights include positions at Shell as Transformation Director and Business Opportunity Manager for Offshore Facilities, where she has led energy projects from the initiation phase to the start of operations. Hartwijk is qualified with the LEAN Six Sigma Green Belt and as an Agile Coach and therefore has the expertise to introduce new work processes in an economically viable way.

Hy2gen's CEO, Cyril Dufau-Sansot, warmly welcomed Hartwijk to the team: "With the appointment of Astrid as COO of Hy2gen AG, we are entering a new era of achievement, where our commitment to shaping the future of sustainable energy will benefit from her experience. She will give a tangible reality to our largescale project implementation worldwide."

# **Investments** in biostimulants

#### Written by

Mr Karan Chechi, Research Director, TechSci Research, India

**Recently, the agricultural** industry has been grappling with simultaneous challenges of increasing productivity to meet the needs of a growing global population and improving resource utilization efficiency, all while minimizing environmental impact on ecosystems and human health.

Fertilizers and pesticides are pivotal in agriculture, serving as essential tools for farmers to boost yields and ensure consistent productivity in various conditions. Over the past three decades, numerous technological advancements have been suggested to promote the sustainability of agricultural production systems by significantly decreasing the reliance on synthetic agrochemicals such as pesticides and fertilizers. An encouraging and eco-friendly innovation involves the utilization of natural plant biostimulants (PBs) that enhance processes such as flowering, plant growth, fruit set, crop productivity, and nutrient use efficiency (NUE), while also bolstering tolerance against a broad range of abiotic stressors. Over the past decade (2009–2019), over 700 scientific papers on "plant biostimulants" have been released according to www.scopus.com. Within this body of research, numerous scientists have successfully shown that both microbial and non-microbial plant biostimulants have the capacity to trigger a variety of

#### The biostimulants sector has a growth rate exceeding 12%

morpho-anatomical, biochemical, physiological, and molecular responses in plants. These responses include enhancing crop productivity, improving nitrogen use efficiency (NUE), and elevating tolerance to abiotic stresses. The Food and Agriculture Organization (FAO) predicts a 34% increase in the global population by 2050, necessitating a 43% boost in the productivity of key staple crops. In the face of evolving climate patterns and shifting arable land areas, the pivotal role of plant and soil sciences becomes apparent in addressing the shared international challenges of ensuring sustainable agricultural and biomass production.

However, effective solutions to these challenges require the integration of knowledge derived from essential plant and soil sciences into innovative applications in agriculture and plant cultivation. This connection is especially crucial given the escalating and more severe abiotic stresses such as drought, salinity, soil organic matter depletion, nutrient deficiency, heavy metal contamination, extreme temperatures, and floods. Consequently, sustainable biological practices, including the utilization of biostimulants that enhance plant

yield, quality, and resilience to abiotic stresses, need to be harnessed for improving agricultural production.

The biostimulants sector, with a growth rate exceeding 12%, holds significant promise. This enthusiasm underscores the increasing interest from scientists and industry professionals in discovering new sources of plant biostimulants tailored to specific agronomic needs. Recently, the Canadian Minister of Innovation, Science, and Industry, François-Philippe Champagne, declared a financial commitment of USD41 mn towards genomics research through Genome Canada's Genomics Applications Partnership Program (GAPP). A significant portion of this funding, exceeding USD23 mn, will be allocated to genomics research in Québec, with USD5.4 mn specifically directed through Génome Québec.

#### **The Fertilising Product** Regulation

The Fertilising Product Regulation (EU) 2019/1009, also known as the Plant Biostimulant Regulation, marks a significant development by officially defining plant biostimulants



within the European Union. According to this regulation, a plant biostimulant is classified as an EU fertilising product designed to enhance plant nutrition processes independently of its nutrient content. The primary objective is to improve specific characteristics of the plant or the plant rhizosphere, such as nutrient use efficiency, tolerance to abiotic stress, quality traits, or the availability of confined nutrients in the soil or rhizosphere. This definition categorizes plant biostimulants based on agricultural function claims, encompassing a variety of bioactive natural substances like humic and fulvic acids, animal and vegetal protein hydrolysates, macroalgae seaweed extracts, and silicon. Additionally, beneficial microorganisms, including arbuscular mycorrhizal fungi (AMF) and nitrogen-fixing bacteria from the genera Rhizobium, Azotobacter, and Azospirillum, are specified as plant biostimulants.

#### The term and concept of biostimulants have both undergone many revisions

Over the years, the term and concept of biostimulants have undergone revisions to reflect the growing interest and research in this field. Initially, biostimulants were described as substances with beneficial effects for plants that did not fall into categories such as fertilizers, plant protection products, or soil improvers. The definition evolved to include bacteria and fungi, expanding the scope of biostimulants to encompass microorganisms. Finally, in 2019, the EU Regulation 2019/1009 formally recognized and established plant biostimulants as a distinct category with specific regulations for their commercialization in the European market.

#### Artificial intelligence

The capabilities of artificial intelligence (AI) are vast, with one of its key strengths being in the realm of exploration. In September 2023, collaboration between Israeli firms Agrematch and ICL, AI will be harnessed for the purpose of identifying novel compounds and biostimulants for enhancing crop nutrition. These compounds aim to optimize factors such as crop yield, soil health, and overall resilience. ICL, a specialty minerals company, has joined forces with Agrematch, an agritech AI startup, to seek innovative solutions for crop nutrition. The agricultural arm of ICL, ICL Growing Solutions, will collaborate with Agrematch's AI technology, known



as Artificial Intelligence for Active Ingredients (AI4AI), to expedite the discovery of new compounds. This process is currently hindered by its high costs and regulatory obstacles, as noted by ICL. In addition to this partnership, ICL has taken the lead in an investment round for Agrematch through its innovation and investment platform, ICL Planet Startup Hub. Furthermore, ICL has extended support by providing Agrematch with access to research and development agronomists and scientists.

Investments in biostimulants reflect a broader shift towards sustainable and environmentally conscious practices in agriculture. As the world faces the challenge of feeding a growing population, biostimulants offer a promising avenue to improve crop productivity while minimizing the ecological footprint of farming. With regulatory support, ongoing research, and a focus on innovation, the biostimulants sector is poised for sustained growth, attracting

#### Investments in biostimulants reflect a broader shift towards sustainability

investors who recognize the potential of these products in shaping the future of agriculture. In September 2023, France's Toopi Organics has secured USD17.2 mn in funding for its agricultural biostimulants business, which utilizes urine. The series A round, led by international fund VisVires New Protein with support from European impact funds Edaphon, Noshaq, MAIF Impact, and BNP Paribas Dévelopment, raised USD11.8 mn. The new capital will be allocated to expanding Toopi Organics' urine collection network, introducing three novel urine-based products, and establishing two additional industrial sites. The startup aims to collect and convert over 2 mn litres of human urine by 2027, in a bid to minimize the reliance on mineral fertilizers in agriculture.

#### Enhanced crop resilience

60%

Source: TechSciResearch

Biostimulants contribute to sustainable agriculture by promoting natural processes within plants. Investors are attracted to environmentally friendly solutions that align with global efforts to mitigate the impact of agriculture on ecosystems. In July 2023, Aphea. bio, located in Ghent and focused on the specialized area of enhancing plant nutrient absorption through microbial strains, has successfully concluded a Series C funding round, securing USD76.22 mn. The collaboration with the Gates Foundation aims to aid the creation of products specifically tailored to assist farmers in Sub-Saharan Africa and South Asia. Further, in March 2023, Agro-100 finalized a significant investment in a cutting-edge liquid

#### Some countries have experienced a surge in interest and investment in this sector

production facility, a strategic move that follows the successful integration of Axter Agroscience, a biostimulant company acquired in 2021. With the establishment of this advanced plant, Agro-100 is poised to solidify its position as a frontrunner in the market. In addition, in November 2023, responding to the concerns raised by farmers seeking ways to enhance crop resilience and improve nutrient utilization, Yara has unveiled YaraAmplix, a fresh line of biostimulants, during the Biostimulants World Congress held in Milan, Italy.

Two significant challenges confronting the industry include an uncertain regulatory landscape in certain regions and market saturation in others. Some countries have experienced a surge in investment and interest in this sector, leading to intense competition for similar markets. The global biostimulant market is most advanced in Europe and the United States, with Europe being perceived as the current leader. Europe is establishing a progressive regulatory framework that positions the industry for robust growth. The United States boasts a large and stable agricultural economy, making it an attractive entry point for companies in this field. Many U.S. farmers are actively seeking innovative solutions to simultaneously reduce environmental impact and increase crop yields, and plant biostimulants are seen as beneficial in this context. The question of the return on investment for biostimulant companies is of great interest to industry observers, but it remains challenging to answer. The variability

#### Factors driving investment in biostimulants

#### Growing awareness of sustainable agriculture

With increasing concerns about the environmental impact of conventional farming practices, there is a global push towards sustainable agriculture. Biostimulants align with this trend, offering a more environmentally friendly alternative to chemical inputs. Investors are drawn to the potential of biostimulants to support sustainable and regenerative farming practices.

#### Regulatory support and recognition

Governments and regulatory bodies worldwide are recognizing the importance of biostimulants in achieving sustainable agriculture goals. The establishment of clear regulatory frameworks has provided investors with confidence and clarity, driving interest in the biostimulants sector.

#### Research and innovation

Ongoing research in plant science and biotechnology has led to the development of advanced biostimulants formulations. Investors are keen to support companies at the forefront of innovation, especially those creating biostimulants with improved efficacy and specificity. The integration of technologies like artificial intelligence and precision agriculture further enhances the appeal of these investments.

#### Global food security concerns

in this space ranges from companies with significant venture and capital investments demonstrating solid returns to startups striving to establish market presence in diverse locations. The difficulty in quantifying this stems from the fact that most biostimulant companies are small to mid-sized, not publicly traded, and not obligated to disclose financial data. Determining their revenue streams can be a complex task. In the early years of the biostimulant industry, there was a predominant focus on marketing to specialty crop growers. However, as companies and other types of growers have gained a better understanding of the product benefits, there has been a growing interest in connecting with major row crops.

#### **Increasing nutrients**

Investments in biostimulants have the potential to reduce the need for fertilizers and improve plant growth

The need to increase agricultural productivity to feed a growing global population is a significant driver of investment in biostimulants. By enhancing crop yields and resilience, biostimulants play a crucial role in addressing food security concerns and ensuring a stable food supply for the future.

> and quality, especially under abiotic stresses. Biostimulants can be applied as foliar or soil treatments and can include substances such as humic and fulvic acids, protein hydrolysates, seaweed extracts, beneficial fungi, bacteria, and algae. They have been shown to enhance the nutritional quality of legumes and increase nutrient content in crops like chickpea, peas, mungbean, and soybeans. Biostimulants also improve turfgrass characteristics and alleviate negative environmental impacts associated with turf maintenance. Additionally, they have the potential to enhance plant tolerance to abiotic stresses and improve plant growth and performance-related parameters. The use of biostimulants can decrease the reliance on synthetic fertilizers and increase resource use efficiency, leading to improved crop yield and quality, particularly under stress conditions.



# **ATOME's green fertilizer** project in Costa Rica

#### Written by

Olivier Mussat, Chief Executive Officer, ATOME PLC, London

Approximately 98% of nitrogenbased fertilizers are made using fossil fuels, feeding around half of the world's population, which is projected to reach 10 bn people by 2050, driving further need for food and fertilizer production. In recent times, the energy crisis and geopolitical tensions have heavily impacted the fertilizer sector, particularly in the non-fertilizer producing regions, like the UK, where price increases and volatility has been rife. In parallel to meeting the growing demand for fertilizer, this industry emits 5% of the world's greenhouse gases, producing greater emissions than both the shipping and aviation sectors combined.

It is therefore imperative, both as an urgent matter of climate and food security, that sustainable alternatives are sought, bringing much needed relief to a sector that impacts our everyday lives.

ATOME's team early-on identified the challenges and demand for green fertilizer, made from zero- carbon ammonia, for use in this hard-to-

#### The Latin American region is the world's largest import market for fertilizers

abate industry. The company is now a leading player in this space and, from as early as 2026, ATOME intends to supply high-quality green fertilizer that will significantly reduce production emissions whilst maintaining agricultural yields.

#### **Agreement with Instituto** Costarricense de Electricidad

The Latin American region is the world's largest import market for fertilizer as well as the world's food basket, meaning there is a demand for both regional supply and sustainable sources of fertilizer.

Building on the progress of the Villeta Project in Paraguay, ATOME for the last 12 months have been extending their model in Central

America, having formed National Ammonia Corporation S.A. (NAC) with local partner Cavendish S.A. Earlier this year, NAC announced that it has agreed a Framework Collaboration Agreement with Instituto Costarricense de Electricidad (ICE), Costa Rica's state power company. The agreement paves the way for evaluating the feasibility of supplying power to a pioneering green ammonia and fertilizer project in Costa Rica, marking a critical step towards securing 100% renewable baseload electricity production for local and global distribution.

As part of the agreement, the parties will work together on defining feasibility, design, as well as technical and economic assessments for the project, including the development of a roadmap in which both parties undertake to implement.

Costa Rica benefits from a stable democracy with an open economy

Endorsed by President of Costa Rica Mr Rodrigo Chaves, this collaboration demonstrates the nation's dedication to attracting foreign direct investments and focus on bringing projects with sustainable development impact as well as job creation in rural areas. This is in line with ATOME's strategy to develop fertilizer projects with not only local impact but also global reach, as the green fertilizer will be exported internationally.



Costa Rica benefits from a stable democracy with an open economy and strong trade relationships, notably with both the United Kingdom and United States. Renowned for its green reputation, Costa Rica's electricity grid is predominately powered by renewable sources and managed by ICE. This landscape further aligns ATOME's objective in meet international standards for environmentally sustainable production of fertilizer.

Costa Rica is a major world food producer. The country is a major supplier of pineapples, in the top ten of banana growers, and a premium coffee producer, to highlight just a few of its products. However, whilst exporting around USD1.6 bn worth of agriculture products in 2023, Costa Rica is entirely dependent on the import of fertilizer in order to sustain its food industry with its farmers consuming 4.5 times the world average per hectare of arable land.



(left) Arenal Volcano, Costa Rica; (above) The President of Costa Rica, Rodrigo Chaves, along with key members of his cabinet, meeting with Olivier Mussat, CEO of ATOME and Silvio Heimann, CEO of Cavendish S.A.

Strategically located between the Pacific and Atlantic Oceans, Costa Rica boasts easy access to international markets, enhancing the export potential of its agricultural products with ports in each ocean separated by only 240 kilometres. This geographical advantage further solidifies its suitability for the proposed fertilizer project.

#### Strategy

The expansion into Costa Rica further demonstrates ATOME's overall plan and its growing reputation as a world leader in green fertilizer for international diversification, showing that ATOME's own developed technical and commercial expertise is able to be scaled on a cost-effective basis elsewhere by focusing on regions with available baseload renewable power, existing infrastructure, and

robust domestic and export marketaccess for its product.

ATOME's flagship 145MW facility at Villeta in Paraguay is expected to be the largest facility of its kind, capable of providing up to 270,000 t of green fertilizer in the form of Calcium Ammonium Nitrate (CAN) fertilizer to domestic and international markets. The Villeta Project is supported by key partners, with the FEED for the project being led by the Swiss ammonia and fertilizer expert contractors, Casale. The proposed Costa Rica project, comparable in scale to ATOME's current Villeta Project, aims to leverage on its past learnings and optimising cost and timelines.

With three major green fertilizer projects underway in Central and South America, ATOME has emerged as a key player in agricultural transition, particularly as these regions supply their food produce across the globe.



# Exploring digestate's contribution to healthy soils

#### Written by

Mieke Decorte, Technical Director and Lucile Sever, Policy Officer, European Biogas Association (EBA), Belgium

The further expansion of biogas production in Europe will see the generation of increasing amounts of digestate. Leveraging its significant advantages will yield benefits for farmers, local communities, and producers alike. The European **Biogas Association is launching** a comprehensive white paper exploring the potential of digestate in fostering healthy soils and advancing sustainable agricultural practices across Europe. Further work is also carried out via the FER-PLAY project, assessing multiple types of alternative fertilizers.

From reducing reliance on costly synthetic fertilizers to promoting effective soil management and restoration, digestate emerges as a key player in addressing mineral imbalances in soils and facilitating efficient carbon capture. Moreover, its utilisation aligns with ongoing developments in EU carbon farming policies, positioning it as a cornerstone in Europe's transition to a greener, more sustainable agricultural sector.

#### What is digestate?

During the anaerobic digestion process, biogas is produced alongside another valuable stream, called digestate. While a portion of the organics from the raw feedstock is converted to biogas during the process, the mineral fraction remains largely intact in the digestate. This makes it an appealing organic-mineral fertilizer.

Raw feedstocks for anaerobic digestion are largely composed of

biodegradable organic matter, poorly degradable or stable organic fraction and nutrients. First, about two thirds of the biodegradable organic matter is turned into biogas, heavily reducing its share in the digestate. Second, for the stable organic fraction, the same amount is present in the digestate and raw feedstock. This stable organic fraction is particularly beneficial for soils as it serves as precursor for humus material, thus improving the clay-humus complex of soils. Thirdly, as biogas is composed of methane and carbon dioxide, fertilizer elements (N,P,K) are preserved in the digestate. Moreover, some of these elements are transformed in the AD reactor to the benefit of plant growth. For example, the organic nitrogen in the substrate is partly mineralised into ammonium, a readily available source of nitrogen for plants.



Poorly gradable or

Several legislations regulate the production, application, and marketing of digestate in the European Union. These policies encompass various aspects of digestate management, including its production processes, quality standards, application rates and environmental considerations. They often depend on the input used in the anaerobic digestion process. Policies governing digestate at EU level include the Waste Framework Directive, the Animal By-Products Regulation, the Fertilizers Regulation, and the Nitrates Directive and the Sewage Sludge Directive.

The framework for digestate at national level is complex and far from being harmonised across Member States. Individual member states may have their own specific regulations and guidelines pertaining to digestate management to ensure compliance with EU directives and to address local environmental and agricultural needs. The crucial aspect regarding digestate on a national scale is to have clear legislation providing legal certainty for all types of products and requirements that can be easily operationalised, thus avoiding red-tape. Additionally, providing an end-of-waste criteria for digestate at national level will have a positive impact on the public perception of digestate. As long as digestate is classified as waste, its value is diminished, hindering its broader acceptance and utilisation.

Regulatory barriers persist, limiting the application of digestate. For example, under the nitrates directive, digestate from manure can only be applied under 170 kg of nitrogen per hectare per year, whereas synthetic fertilizers can be used above this limit to reach the nitrogen requirement for each specific crop. The lack of fertilizer or product status for digestate in national law is another major barrier as it leads to a restricted use of digestate or at least a depreciation of its value.

Raw feedstocks Biogas CH, and CO,

**Figure 1.** What happens in the digester?





#### Positive impact on environment, climate, and soil health

Digestate has the potential to drive Europe's agricultural sector towards regenerative practices and offers an attractive, sustainable alternative to commonly used synthetic fertilizers. The incorporation of digestate or its derivatives in EU agronomic practices contributes to the achievement of the strategic objectives for resource efficiency, the circular economy, and overall environmental stewardship. Utilising digestate enables a reduction in synthetic fertilizer usage as stipulated by the Farm to Fork strategy, has a positive impact on soil management and restoration, addresses mineral imbalances, and tackles the deficiency of organic matter in soils as outlined by the EU Soil Strategy. Moreover, it facilitates efficient carbon capture, aligning with ongoing developments in EU carbon farming policies.

# Fertilizer Focus Media pack 2024



# 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



### Fertilizer Focus





# Fertilizer Focus







# **Editorial schedule**

#### January/February issue

#### Advertising due date - 8 December 2023

#### **Special Focus - CLEAN AMMONIA**

- Key global clean ammonia production hubs
- Market expansion
- Unlocking the hydrogen economy

#### **SUPPLEMENT - LATIN AMERICA**

- Infrastructure & logistics in Brazil
- Policies and regulations in Latin America
- The impact of El Nino

#### May/June issue

Advertising due date - 12 April 2024

#### Special Focus - Technological advancements

- Innovations in packing and material handling
- Next generation of plant nutrition
- Digital applications for the fertilizer industry

#### **SUPPLEMENT - AFRICA**

- Infrastructure investments
- Copper demand supporting sulphur imports to S Africa
- North Africa: the new price driver for sulphur
- The growth prospects for specialty fertilizers in East Africa

#### September/October issue

Advertising due date - 9 August 2024

#### Special Focus - Fertilizer sustainability

- Decarbonisation progression
- Sustainability investments in Africa
- Revitalizing soil fertility

#### **SUPPLEMENT - Europe**

- East Europe capacities
- Importing fertilizers
- European policy update

#### March/April issue

#### Advertising due date - 9 February 2024

#### Special Focus - Added Value fertilizers

- Micronutrients as adjusters for plant growth
- Investments in biostimulants
- Adapting strategies to adopt AVFs

#### **SUPPLEMENT - Asia**

- Future growth in India
- Phosphate protectionalism policies in Asia
- Laos' emergence as a potash power in southeast Asia.
- What happened to Australia's SOP wave?

#### July/August issue

Advertising due date - 7 June 2024

#### Special Focus - The fertilizer economy

- Funding new projects
- Hedging tools to de-risk project development
- Fertilizer affordability
- Market opportunities for investors

#### SUPPLEMENT - Middle-East

- The changing nature of regional nitrogen investment
- Market impact from conflicts
- Rising sulphur production fin the Middle-East

#### November/December issue

#### Advertising due date - 11 October 2024

#### **Special Focus - FEnhanced efficiency fertilizers**

- Advancements for additives and coatings
- NPK processing technology
- New methods for increasing yields

#### **SUPPLEMENT - North America**

- Mexico: market overview
- Canada's rail network and the risk of bottlenecks
- Lithium and the increasing in sulphur consumption in North America
- US Inflation Reduction Act impact on nitrogen plant investments

# 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 2023 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

North America 24%



■ 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.

### Fertilizer Focus

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# Fertilizer Focus

#### **Argus events**

- Argus Asia Fertilizer Argus East Europe Fertilizer
- Argus Europe Fertilizer
- Argus Clean Ammonia
- Argus Vehicle Emissions and DEF Summit USA
- Argus Paris Grain Conference

#### Global distribution breakdown

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



#### **Regional distribution of Fertilizer Focus recipients**

- Fertilizer Latino Americano (FLA)
- 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 2024

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 Issues3 -5 Issues1 Issue(10% discount)(20% discount)		6 Issues t) (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 2024					
Edition	Due date				
January/February	8 December				
March/April	9 February				
May/June	12 April				
July/August	7 June				
September/October	9 August				
November/December	11 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:

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- 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.

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

### Fertilizer Focus

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### Fertilizer Focus

#### Full page

Trim size: 297mm(h) x 210mm(w) **Bleed size:** 303mm(h) x 216mm(w) Type area: 275mm(h) x 185mm(w)

#### HALF PAGE (Horizontal)

**Trim size:** 128mm(h) x 180mm(w) Type area: 118mm(h) x 170mm(w)

#### HALF PAGE (Vertical)

**Trim size:** 250mm(h) x 86mm(w) Type area: 240mm(h) x 76mm(w)

#### **THIRD PAGE (Horizontal)**

Trim size: 62mm(h) x 180mm(w) Type area: 54mm(h) x 172mm(w)

#### **THIRD PAGE (Vertical)**

Trim size: 122mm(h) x 112mm(w) Type area: 114mm(h) x 104mm(w)

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# Fertilizer Focus

For advertising and editorial information please contact: stefan.worsley@argusmedia.com

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- An experienced editorial team who pursue a progressive editorial policy
- Regular contributions giving insight on global fertilizer markets from Argus's sector leading team of market reporters and analysts.

For more information and to take a look at our media pack please contact **Stefan Worsley:** 

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# Fertilizer Focus



argusmedia.com

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#### IN THE NEXT ISSUE...

#### **SPECIAL FOCUS: THE FERTILIZER ECONOMY**

- Funding new projects
- Hedging tools to de-risk project development
- Fertilizer affordability
- Market opportunities for investors

#### **SUPPLEMENT: MIDDLE-EAST**

- The changing nature of regional nitrogen investment
- Market impact from conflicts
- Rising sulphur production fin the Middle-East



# **Argus AgriMarkets**

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

#### For more information visit: www.argusmedia.com/agriculture



SUMMARY

#### **Argus** AgriMarkets Daily grains, seeds and oils prices, news and analysis

Key prices Loading Bid Offer Mid ±

Issue 21-203 | Thursday 14 October 2021

### 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 con-cerns 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 de-liveries 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 agrees 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

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		,495.00	1,505.00	nc
RSO fob Dutch mill	FMA		,465.00	1,475.00	-10.00
RSO fob Dutch mill	NJJ	1	,405.00	1,415.00	nc
Dry grains freight rates					\$/t
Route Size	a '000t		\$/t		+
Santos-Qingdao	60		69.40		+0.30

#### AGRITEL OUTLOOK

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

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

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Agriculture illuminating the markets

### **Market Reporting**

Consulting **Events**