The global fertilizer market: taking stock of a tightening market situation

1. Setting the scene: rapidly rising fertilizer prices in 2021

International fertilizer benchmark prices have risen throughout 2021, with many quotations reaching all-time highs. The most notable increases have been registered for nitrogen (N) fertilizer. Prices for urea, a key N fertilizer, have more than trebled over the past 12 months, e.g., nominal quotations for black sea spot prices (bulk) have risen from USD 245/tonne in November 2020 to USD 901/tonne in November 2021 (Figure 1), with much of the increase registered in the second half of the year.

Prices for phosphorous fertilizer (P) have risen in tandem. Those for diammonium phosphate, or DAP, a key composite P fertilizer, have doubled from USD 360/t to USD 726/t over the same period (figure 1). Clearly, the price increase for DAP fertilizer also reflects higher prices for the N-component. There was, however, also an equal effect from higher P-fertilizer prices, which is estimated to have accounted for about 50 percent of the overall increase in DAP prices. On the other hand, prices for potash (K-fertilizer), remained less affected over the past 12 months (Figure 1).

Have price increases come to a halt?

Official quotations for representative indicator prices for December 2021 and January 2022 are not yet available. However, private industry surveys\(^1\) in the US, suggest that global momentum has stalled, with prices at the wholesale level seeing some initial downward pressure, notably for monoammonium phosphate (MAP). But much uncertainty abounds as to whether price-easing is short-lived or if it marks a longer-term tendency.

Finally, and contrary to the price trends in Europe, US prices for potash fertilizer rose rapidly in 2021, essentially doubling over the past 12 months (Figure 2).

\(^1\) https://www.dtnpf.com/agriculture/web/ag/crops/article/2022/01/19/fertilizer-prices-continue-mostly
2. Understanding the drivers of fertiliser markets and price developments

As in all commodity markets, fertilizer prices are determined by the interplay of supply and demand. On the supply side, (i) high and rising energy prices; (ii) disruptions in trade and high transportation costs, while on the demand side, (iii) high crop prices and hence high affordability.

High and volatile energy prices: Natural gas plays a pivotal role in the production and hence the price of N-fertilizer. Prices for natural gas underwent a sharp increase in 2021, reflecting a host of reasons. For instance, adverse weather conditions around the world hampered renewable energy production as well as coal, leading to higher gas demand and prices. To compensate for a fall in gas supplies from Russia (a major exporter), Europe has begun importing large quantities of Liquefied Natural Gas (LNG) from the US\(^2\), easing supply tightness in natural gas markets and contributing to a drop in gas prices in December 2021 and January 2022 (figure 3).

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Trade policies and higher transportation costs: In response to rising global demand for fertilizers and rising domestic prices, a number of key suppliers have responded with export restrictions placing further upward pressure on international fertilizer prices (especially in late 2021). Concerning transportation costs, the COVID-19 pandemic has caused widespread disruptions in international supply chains, resulting in higher freight costs and longer transit times. Prices for bulk and container shipments saw marked increases until September 2021 (figure 4).

High crop prices and high affordability\(^4\): Output prices also reached multi-year highs in 2021. According to the FAO Food Price Index (FFPI), international food commodity prices rose from 113.5 to 134.1 index points between January and December 2021, the highest level since June 2011. However, the rapid rise in fertilizer prices lowered affordability at different speeds and extents. Commodity-wise, while affordability of fertilizers for cereals and sugar production declined to levels seen in 2020, it remained considerably higher for oils and oilseeds (Figure 5).

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\(^3\) https://investing.com

\(^4\) Affordability here is simply defined as the ratio of inputs (i.e., fertilizer) to output prices (e.g., the FFPI)
3. What are the prospects for 2022/23?

High and volatile fertilizer prices have given rise to concerns about low fertilizer availability in 2022/23, with potentially adverse effects on food production and food security. And, while the most recent declines in gas prices could be a harbinger of a notable relaxation of a still tight market situation, international fertilizer supplies remain restricted, stocks are depleted and geopolitical tensions could spark additional supply restrictions at short notice. These uncertainties make forecasts for fertilizer use in 2022/23 extremely difficult. This assessment will therefore remain at a qualitative level, explaining how higher fertilizer prices could affect input use and food production in the current crop year.
Into the new year - immediate effects
Some immediate effects of current fertilizer shortages are already manifest. Apart from generally high prices, fertilizers were simply no longer available in the market as numerous production plants, faced with negative margins, had to stop production. Not only were gas prices too high to profitably operate urea plants, they were also too high to operate heating in greenhouses, particularly in Europe\(^5\), which is likely to reduce fruit and vegetable supplies in the coming months. Prices for these products are expected to remain high or even rise further, adding to food inflationary pressures in the region.

Overall prospects for 2022/23

Overall lower fertilizer affordability in 2021/22 suggests lower fertilizer use in 2022/23. The International Fertilizer Industry Association (IFA), for instance, estimates a decline of total fertilizer use of 3 percent in 2022/23. This would be a rather modest reduction compared to the contractions in the high price episodes of the past. For instance, when P-fertilizer prices rose steeply in 2008/09, global average P-fertilizer application declined by 8 percent relative to 2007, those for K-potash by even 16 percent\(^6\). Unlike for N-fertilizer, a reduction in P and K fertilizer, if limited to one season, may not necessarily result in major yield loses. Both P and K may therefore face significantly lower demand in 2022/23, if prices remain high and affordability stays low\(^7\). Lower levels of N-fertilizer applications, however, would steepen lower output and quality of food production. Particularly in developed countries, farmers invariably try to maintain high fertilizer use levels, even when prices soar. In 2008, for instance, global N-fertilizer applications declined by less than 1 percent relative to those prevailing in 2007.

In poorer countries, fertilizer use could decline faster, including N-fertilizer. Given that past experience shows that farmers in developed countries are rather unresponsive to increases in N-fertilizer prices, by contrast, farmers in developing countries would face lower availabilities and be forced to reduce applications. This occurred in 2009, for instance, when the use of N-fertilizer in Africa declined by 13 percent relative to 2008.

Added price pressure could arise from the growing need of N and P ingredients in non-agricultural use. For example, concerning N, industrial grade ammonia is now used in large quantities in catalytic converters of diesel engines. The rise in ammonia prices has already resulted in a near ubiquitous shortage of the required additive ("AdBlue"). Similarly, the use of P to manufacture lithium-ion batteries could mean that an increasing amount of the ingredient will be siphoned off from the fertilizer market.

Yet, there are also factors suggesting that farmers can use fertilizer more flexibly and will be hence more responsive to price changes. Unlike in the past, they now have tools to rationalize application levels without necessarily compromising output. Such tools include variable-rate application methods, precision agriculture and greater access to finance in acquiring inputs. There are also larger quantities of organic fertilizer made available and farmers have improved capacities to apply them in a more accurate, methodical and timely manner. Moreover, there are a growing number of markets and exchanges, providing trading possibilities, so that organic fertilizer can be bought and sold within a given region, potentially helping to offset local deficits of mineral fertilizer supplies.

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\(^6\) In terms of nutrients, based on FAOSTAT
\(^7\) FAO encourages farmers to examine available P and K levels in their soils and rationalize the nutrient applications based on the results of these tests on a field-by-field basis.
4. What can be done to avert negative impacts on global food production?

In the short-term:
- **Keep trade open.** Arguably the most important contribution would be to lift export restrictions so as to satisfy demands in the global marketplace.

- **Avoid ad hoc producer protection.** Likewise, all measures to make domestic fertilizer more affordable must be carefully weighed against their potentially detrimental effect on international markets. For instance, while short-term reductions in import tariffs will help improve access for domestic farmers, they will inevitably also add to the upward pressure on international prices. Likewise, increasing subsidies for domestic use will increase fertilizer applications at home, but lower availability abroad and add pressure on international prices. Finally, subsidies to resource-poor farmers must be weighed against their potentially negative global production effects. If subsidies shift fertilizer use from efficient to inefficient farmers, overall food production could fall, particularly in view of the low short-term responsiveness of fertilizer supply.

- **Support poor consumers.** High prices of food and energy are regressive on poor consumers. Figure 7 ranks consumer spending on food, as well as fuel, water and housing across the most exposed countries to large expenditure shares in these categories. Even the rather low food and fuel prices of 2017, households in 30 countries spent 60 percent or more of their incomes on these necessities. Preliminary estimates for 2021 suggest that another 23 countries have joined this group and that the average household expenditure shares in these 53 countries (30 plus 23 new ones in 2021) have risen from 62 percent in 2017 to 69 percent in 2021. For many consumers, this may mean either lower quantities or qualities of food consumption, or both, and hence more hunger and malnutrition, or less money for other necessities such as health and education. Curtailing such important expenditures could send communities into a vicious cycle of deepening food insecurity and poverty, with potentially irreversible effects.

- **Improve market transparency.** At the 20th Session of the Global Food Market Information Group of the Agricultural Market Information System (AMIS), several country focal points expressed interest in analysing input costs, their composition, impacts of changes on margins for producers, and more generally, the profitability of different agricultural activities. In view of the current conditions in international energy and fertilizer markets, the initial focus was placed on collecting and compiling supply-utilization balances for the N-fertilizer market. Based on this prospective information, the Secretariat will attempt to assess the levels and distribution of fertilizer stocks and calculate early warning indicators such as stock-to-use ratios and stock-to-disappearance ratios in fertilizer markets. These can provide useful signals to indicate impending market tightness and possible price hikes that could transcend to global food markets.
In the longer term

- **Affordable and greener fertilizer production, based on renewable energy.** Promote green fertilizer production, notably green ammonia, replacing traditional energy feedstocks such as gas and coal with solar, wind and hydrogen.

- **Understand policy trade-offs.** There is a need to recognize that policy-induced higher fossil fuel prices for climate change mitigation also means higher food prices for poor consumers. Channel back proceeds from carbon taxes to resource-poor consumers.

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8 FAO Food Outlook, November 2021
- **Review and repurpose fertilizer subsidies to promote fertilizer and manure use efficiency.** Fertilizer subsidies are still the policy tool of choice to boost food production and improve food security, particularly in food deficit countries. These subsidies help increase the profitability of production, and foster rises in food production swiftly and substantially. Apart from the high fiscal burden, these subsidies often result in sub-optimal fertilizer use efficiency and can lead to environmental problems (e.g., pollution of surface and groundwater, soil and air, as well as increased greenhouse gas (GHG) emissions). No doubt, some of these subsidies may need to be maintained to ensure sufficient food production; there may, however, be also scope to repurpose some of these subsidies to promote measures that help improve fertilizer use efficiency and avoid harmful environmental effects.

- **Prioritize the agricultural use of fertilizer over non-agricultural use.** The case of biofuels serves as an important lesson in how the diversion of supplies away from food to industrial markets can escalate food crises. Measures, which are gathering in pace especially in Europe, to ban the sale of new diesel automobiles that require ammonia-based additives, are a step forward. However, in endeavours to mitigate climate change, the world may need to rebalance the propensity for intensive farming to more sustainable farming models. Again, the global poor would need redress to safeguard their food security and rural livelihoods.