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To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
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Subject:	ANNEXES to the COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Ensuring availability and affordability of fertilisers

Delegations will find attached document COM(2022) 590 final - ANNEXES 1 to 2.

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COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Ensuring availability and affordability of fertilisers

Annex 1

The importance of fertilisers for food security and the risk of over-usage

Fertilisers play an important role for the production of food. As much as 50% of global food production today is said to depend on the use of mineral fertilisers. By the same token, the intensive use of fertilisers has a significant impact on health, the climate and the environment.

The addition of **nutrients** to the soil through fertiliser increases, within biological limits, the production of biomass and the potential **yield of crops,** and helps capture carbon dioxide. Plants absorb nutrients from the soil and use them for growth, thereby depleting the soil. Fertilisers add nutrients back to the soil. A higher quantity of output (i.e. grain, grass etc.) can be produced on a smaller surface, which limits the agricultural area needed for food production globally.

Fertilisers can be of **mineral or organic** origin.

There are three key nutrients for plant growth: **nitrogen (N), phosphorus (P), and potassium (K[1])**. Phosphorus and potassium are nutrients contained in mined ore and rock (mineral fertilisers). Nitrogen is the nutrient used in the largest quantity for the world's cereal crops. It needs to be applied regularly whereas farmers can forego the application of phosphorus and potassium for a certain period without a negative impact on yields.

While it is difficult to establish a precise ratio, an unpremeditated 20% reduction of nitrogen fertiliser in the growing of a crop such as wheat in the EU is expected to lead to a reduction in yield of 4-5% (based on the optimum fertilisation rate)[2].

The production of synthetic nitrogen fertilisers requires a lot of energy. In the EU, the energy source is normally natural gas which also serves as the feedstock for producing the hydrogen (H_2) needed for **synthetic nitrogen fertilisers (the intermediate product being ammonia** (NH_3)). In this process, nitrogen is won from the air.

The production of nitrogen fertilisers generates significant **CO_2 emissions**. This happens regardless of the constant improvements in abatement technologies, especially at EU production sites.

If fertilisers are not properly applied, **nutrient losses** can account for up to 50-60% of the amounts applied to fields. The EU exceeds, by a factor of more than 3 for nitrogen and by a factor of 2 for phosphorus, what are considered to be the safe planetary boundaries for fertilisers. Fertilisers are over-applied in many parts of the EU with little obvious yield gain. More than 90% of the EU's total (gaseous) **ammonia** emissions come from agriculture; 80% of these come from manure and 20% from mineral fertiliser. Fertiliser **leaching and run-off**, due to excess application, are key causes of excessive nutrient concentrations in soil and water which can damage ecosystems and water quality. Such effects may stem from mineral and

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1 K stands for kalium.

2 This data derives from scientific trials undertaken by a fertiliser producer over the last 15 years based on multiple nitrogen rates. It has to be noted that in certain regions in Europe the optimum fertilisation rate is exceeded.

organic fertilisers alike, to different degrees (unprocessed manure tends to have worse leaching characteristics than mineral fertilisers). When fertilisers leak into the environment they also spur the production of **nitrous oxide**, a potent greenhouse gas.

The goal of an **optimised fertiliser use efficiency** is to narrow the gap between the actual and the attainable crop yield, thereby reducing the waste of fertilisers and the harm for the environment.

The complete substitution of mineral fertilisers by **organic fertilisers**, which generate no or less emissions during production, is not feasible in the short term given existing land and food security constraints and current dietary patterns. **Significantly lower use of and dependence on imported mineral fertilisers** can, however, be achieved by deploying and scaling up circular economy approaches such as recycling nutrients from wastewaters and other biowaste (such as composted green waste from households) or by using processed manure to improve run-off characteristics. There are for instance rules on the minimum reuse and recycling rates for phosphorus and nitrogen from sludge, which the Commission has proposed in the revised Urban Wastewater Treatment Directive[3].

Increasing on-farm nitrogen use efficiency by improving farming practices, soil knowledge and harnessing precision farming and enforcing pollution prevention and reduction measures in the Nitrates Action Programmes are essential to reducing excessive fertiliser use and will contribute to reducing losses to the environment and improving nutrient retention. So are increased support for organic farming, growing crops that have less nitrogen needs or fix nitrogen from the air thereby nourishing the soil. All of these approaches harbour the promise of generating environmental, climate and economic co-benefits and will strengthen the EU's open strategic autonomy. Policies and measures supporting these approaches should be accelerated to improve EU's resilience and food security.

[3] Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment.

Annex 2

The situation of the fertiliser markets in the EU and in the world

The **European fertiliser industry** has more than 120 production sites scattered throughout the majority of Member States, a sign of its strategic role in relation to food security. It employed 61 000 people in 2017 and had an average turnover of EUR 23.3 billion in 2017-19.

On average, the total EU27 **production of intermediate and finished fertiliser products** was 40.2 million tonnes (2019-2021). The main producers in terms of value are Germany, Poland, France and Spain. Besides the production of mineral fertiliser products, EU27 plants produced 12.2 million tonnes of ammonia, mainly used for producing fertilisers but also in other industries, such as for chemicals. AdBlue, produced from ammonia, is used a reagent to reduce air pollution from diesel exhausts and is critically important for supply chains because of the use of trucks for transport. Carbon dioxide is an important by-product of ammonia production[4].

Table 1: EU production of intermediate and finished fertiliser products (1000 tonnes)

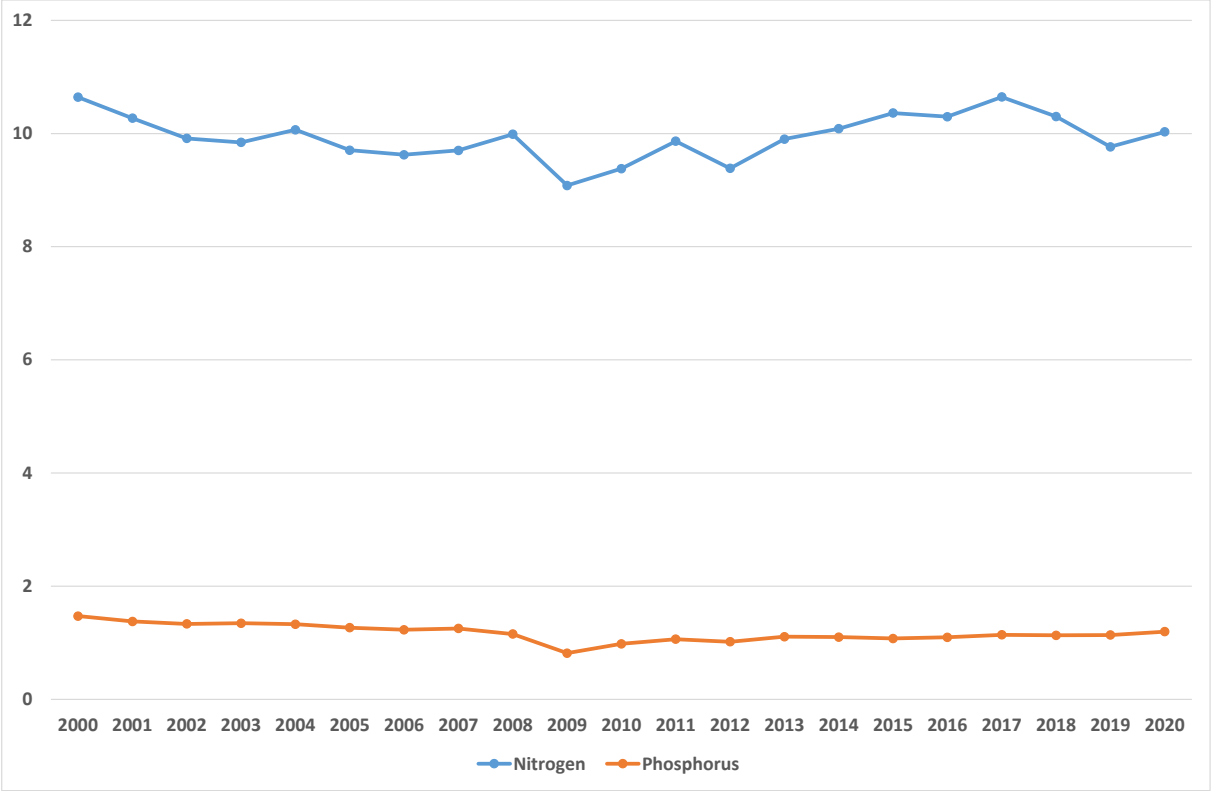
Fertiliser Production in EU	2019	2020	2021	**Average 2019-2021**
Nitrogenous (1000 tonnes of N)	16079	17417	17974	**17157**
Phosphatic (1000 tonnes of P2O5)	982	1015	1182	**1060**
Potassic (1000 tonnes of K2O)	6248	3911	2210	**4123**
Mixed fertilisers with 2 or 3 nutrients (1000 tonnes of product)	17033	16231	20430	**17898**
Total Production (1000 tonnes)	**40342**	**38574**	**41796**	**40237**

Source: EUROSTAT Prodcom

The **consumption of mineral nitrogen fertilisers** in agriculture is estimated to have been 10.3 million tonnes (expressed in tonnes of nitrogen) in the EU-27 in 2018. **Mineral phosphate fertiliser consumption** reached 1.2 million tonnes in 2018. Consumption of synthetic nitrogen fertilisers remained relatively stable during 2000-2018 while consumption of mineral phosphorus fertilisers decreased from around 1.6 million tons in 2000 to 1.2 million tonnes in 2018.

[4] Used for animal stunning, for packaging meat to prolong shelf-life and for fizzy drinks.

Figure 1: Use of mineral fertilisers in the EU (million tonnes of nutrients)



Source: Eurostat

International trade in fertilisers is highly concentrated, with the top five exporters of nutrients accounting for 43% of global trade in 2020 in nitrogen (N), 76% for phosphates (P) and 83% for potash (K). Deposits of the raw materials used in the production of fertilisers are unevenly distributed. Global phosphorus deposits are all located outside Europe: around three quarters of the mining of **phosphate rock** are divided among China, Morocco, Saudi Arabia, Russia, the United States and Tunisia. The **potash deposits** in Belarus, Canada and Russia account for 68% of global deposits.

The **EU imported** around 26 million tonnes of nitrogen, phosphate and potash and intermediates in 2021, principally nitrogen-based (10.6 million tonnes), i.e. ammonia, urea, urea ammonium nitrate, ammonium nitrate etc., potash (3.4 million tonnes), phosphorus and precursors (6.4 million tonnes) as well as compound fertilisers containing the three nutrients nitrogen (N), phosphorous (P) and potassium (K) (5.6 million tonnes). Imports represent respectively 30%, 68% and 85% of the EU consumption of nitrogen, phosphate and potash nutrients. As regards **phosphates**, 28% of EU imports originate from Morocco and 23% from Russia. As regards **potash**, 64% of EU imports[5] originated from Russia and Belarus[6].

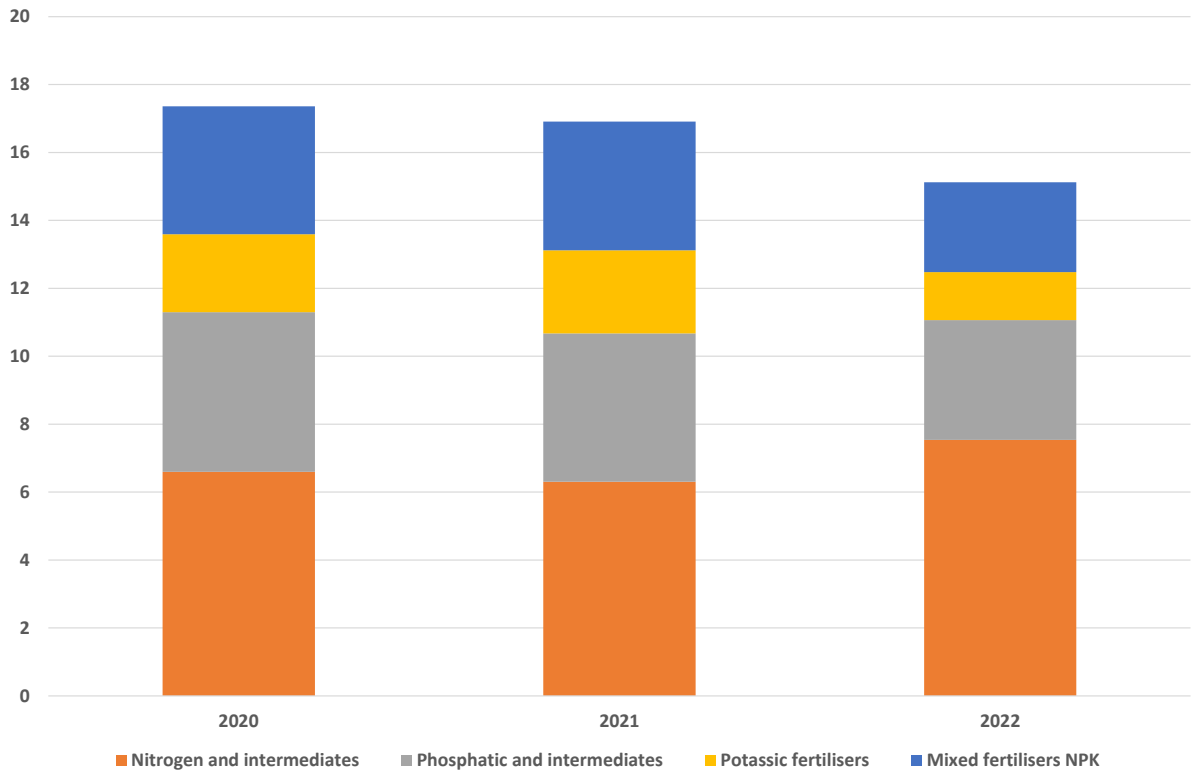
Estimates for 2022 based on the first eight months of the year show an overall decrease of fertilisers imports by around 13%, essentially concerning potash, phosphates and compound

[5] EC (2020), Non-critical Raw Materials Factsheets, p. 412.

[6] On 24 June 2021, the EU imposed restrictive measures on imports of potash from Belarus in response to the escalation of serious human rights violations in the country.

fertilisers, while the imports of ammonia and nitrogen fertilisers have increased substantially in 2022 (+19% for the eight first months of the year compared to the same period in 2021).

Figure 2: EU Imports of intermediate and finished fertilisers (million tonnes of products) – January to August

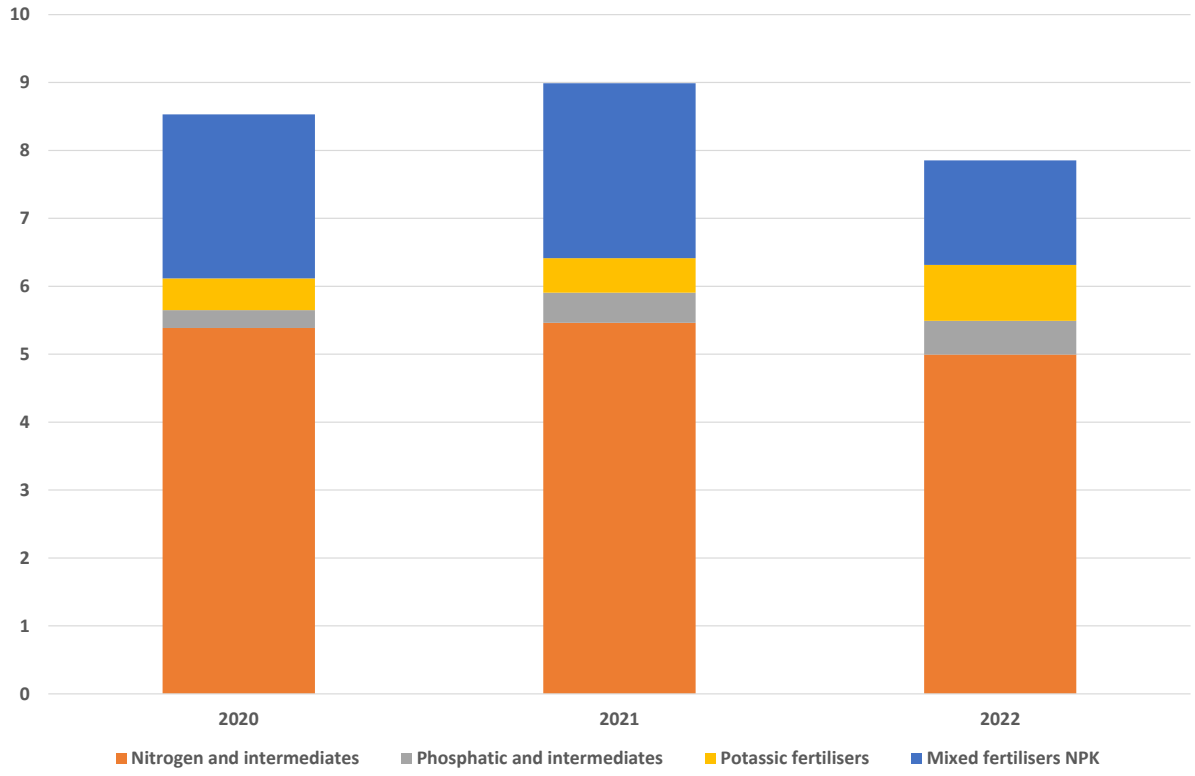


Source: Eurostat -Comext

EU fertiliser exports amounted to 12.9 million tonnes yearly in 2021, essentially nitrogen fertilisers (7.8 million tonnes) and compound fertilisers (3.6 million tonnes).

In 2022, there are lower exports of mineral fertilisers (-13% for the eight first months of the year compared to 2021).

Figure 3: EU Exports of intermediate and finished fertilisers (million tonnes of products) – January to August

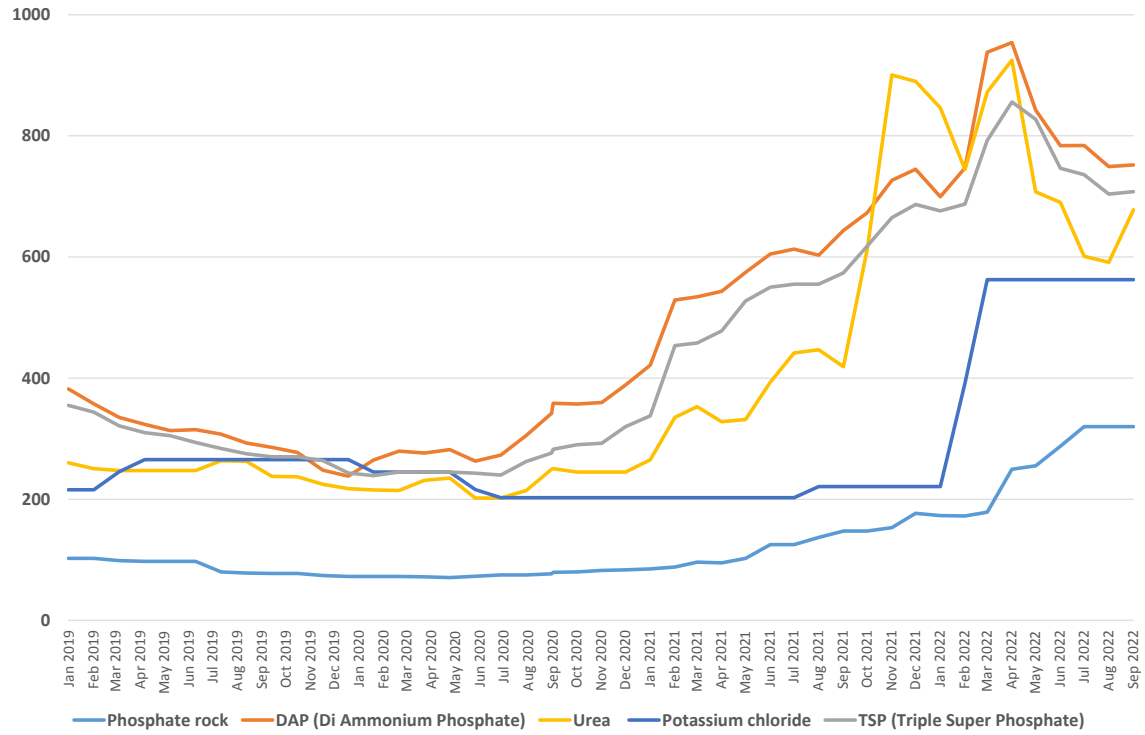


Source: Eurostat -Comext

High and unstable fertiliser prices are a challenge for EU farmers. Fertilisers represent a **significant share of farmers' input costs**, around 6% in average over 2017-2020 and 12% for specialist arable crops farmers. High agricultural commodity prices may make it worthwhile for arable crops farmers to consider using optimum fertiliser quantities regardless of high prices. But farmers **do not have certainty about future crop prices**. Fertiliser price indices have lately been increasing more than food commodity price indices, pointing to a scissors effect. Farmers usually build up fertiliser stocks for the next crop season during the summer. In 2022, they have been delaying these purchases.

Global fertiliser prices have progressively surged since the beginning of 2021, with peaks between September and November 2021, after Russia's invasion of Ukraine and in April 2022. Since then, they have decreased slightly, nitrogen and phosphate fertilisers in particular. Recent increases have been recorded in September, for urea in particular. Compared to the average in the reference period of 2016-2020, in September 2022, they are still at very high levels: +128% for diammonium phosphate, +200% for urea and +141% for potash.

Figure 4: World price for fertiliser products (USD/tonne)



Source : World Bank Commodity Price Data

Global fertiliser markets have been strongly affected by Russia's invasion of Ukraine, in particular due to their dependence on natural gas and to market disruptions, including **export restrictions** imposed by key producing countries like Russia and China. Russia is the world's leading exporter of fertilisers, especially of nitrogen, and the second most important exporter of phosphate fertilisers. Restrictions of fertiliser exports imposed by an important producer like Russia are particularly disruptive for the global market.

The affordability of fertilisers has been deteriorating as fertiliser prices have been rising faster than agricultural commodity prices. Many countries worldwide rely on only a few trading partners for their fertiliser imports and hence, they face steeper fertiliser import bills and higher costs of production that will in turn negatively affect harvests. If high fertiliser prices persist into the next planting seasons, the problem is likely to expand to rice production, affecting some 3 billion people in the Americas and Asia, for whom rice is the main staple food.