



FERTILIZERS MARKET: EFFECTS ON ARGENTINE AGRICULTURE

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Summary

- In the last year, fertilizer prices showed a marked increase, even in relation to the price of grain. In the case of maize, Argentina needed between 30% and 39% more grain in July to buy the same amount of fertilizer as last year, which negatively impacts the producer's decision.
- Given the importance of imported fertilizers as a percentage of Argentina's total consumption, import needs increased significantly. In this context, concerns are raised about measures imposed by the Central Bank for the acquisition of foreign exchange for imports, with a ceiling equivalent to the lower value of FOB imports of 2021 plus 5%, or of imports of 2020 plus 70%, Estimated at USD 1.89 billion.
- Considering a baseline scenario (average quantities 2020 and 2021, and average prices Jan-Jun 2022), the ceiling would be reached in August, leaving 57% of import requirements unmet by the end of the current year.
- Two extreme alternative scenarios are also discussed. The first scenario assumes a smaller planting of maize, which would be used for soybean cultivation. Although import requirements would fall, the BCRA ceiling would still be exceeded, and the exchange rate would imply lower foreign exchange income from grain exports, with net damage to the balance of payments. The second alternative scenario assumes prices for the rest of the year equal to the June 2021 levels, and again the amounts imposed by the BCRA would be greatly exceeded. Indeed, for imports to reach the BCRA-enabled limit without compensating for quantities, prices of imported fertilizers would need to fall, on average, 58% below those of June 2021. In practice, a combination of these effects would be expected, with falling prices and quantities, although these needs are hardly within the permitted limits.
- To alleviate the situation, the BCRA took measures seeking to grant more flexibility in imports of inputs, but concerns remain about the volume of business that could take advantage of this exception. As such, the market will have to be closely monitored in the coming months.
- Failure to prioritize the difficulties that exist today in fertilizer markets could result in lower foreign exchange availability, due to the potential impact on production of said restrictions.
- Although Argentina's production conditions give it some flexibility in volatile international input price contexts, the consequences that such management could have in the medium term with respect to the effects on sustainability, both productive and environmental, cannot be ignored.
- Argentina has enormous potential to increase yields per hectare in a sustainable way by closing technological gaps where fertilization is an essential component.



Introduction

The recent fluctuations in fertilizer markets have created uncertainty on several fronts, on the side of the input-output ratio faced by producers and on the future availability of nutrients for summer crops. In addition to these issues faced by all crop producer countries, Argentina faces unique challenges regarding recent measures related to the acquisition of foreign currency for imports. Analyzing the impact of these policies on the rest of the 2022/2023 farming season will be the primary focus of this article.

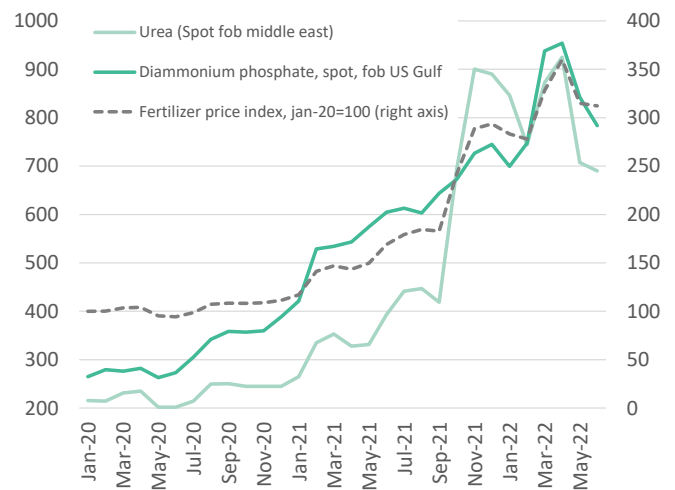
Global market

In 2021, fertilizer prices increased sharply. Using the average fertilizer price index calculated by the World Bank (Figure 1) as a reference, prices were 164% higher in December 2021 than in the same month of 2020, with an increase of 92% for diammonium phosphate (DAP) and 263% for urea, mainly due to higher input prices and export restrictions by major producers.

As shown in Figure 2, Russia, China, Canada and Morocco are the main net exporters of fertilizers. Russia holds 14% of global trade, followed by China, which accounts for 12%. Therefore, changes in these markets may be important to global trade in these inputs.¹

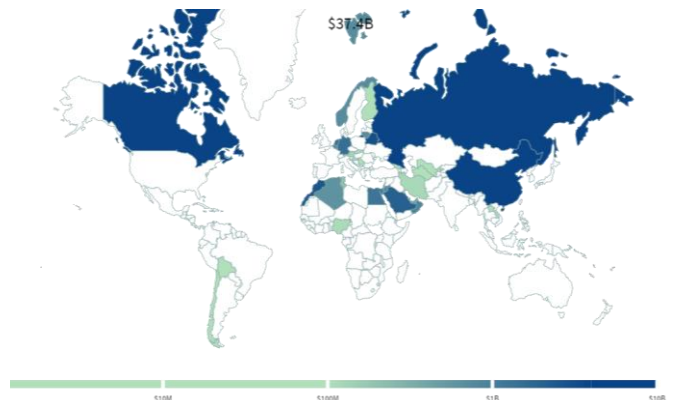
During 2021, the increase in the price of natural gas reduced the production of ammonia, vital for nitrogen-based fertilizers (Baffes, & Wee Chian, 2022). At the same time, the rise in coal prices increased electricity costs in China where rationing of electricity consumption caused some fertilizer plants to decrease their production (USDA-FAS 2022).

FIGURE 1: INTERNATIONAL FERTILIZER PRICE – USD / TON



Source: World Bank

FIGURE 2: TOP NET EXPORTERS OF FERTILIZER – 2019 – BILLIONS USD



Source: Atlas of economic complexity

In late July 2021, China implemented a quota for fertilizer exports to insulate itself from rising fertilizer prices and ensure domestic supply. The global effect was immediate. In August, fertilizer exports fell 26.3% (Chen, & Tinti, 2022) causing a major impact on global fertilizer supply as China produces approximately 25 percent of the world's fertilizers (USDA-FAS 2022).

The volatility experienced in fertilizer markets continued in early 2022. The Russian invasion of

¹ <http://inai.org.ar/aec19>



Ukraine in February 2022 led to a dramatic rise in fertilizer prices, reflecting concerns about the effect of the war on Russian fertilizer exports and by extension on global fertilizer supply, given that Russia has the highest value exports in the world (Fernández, 2022).

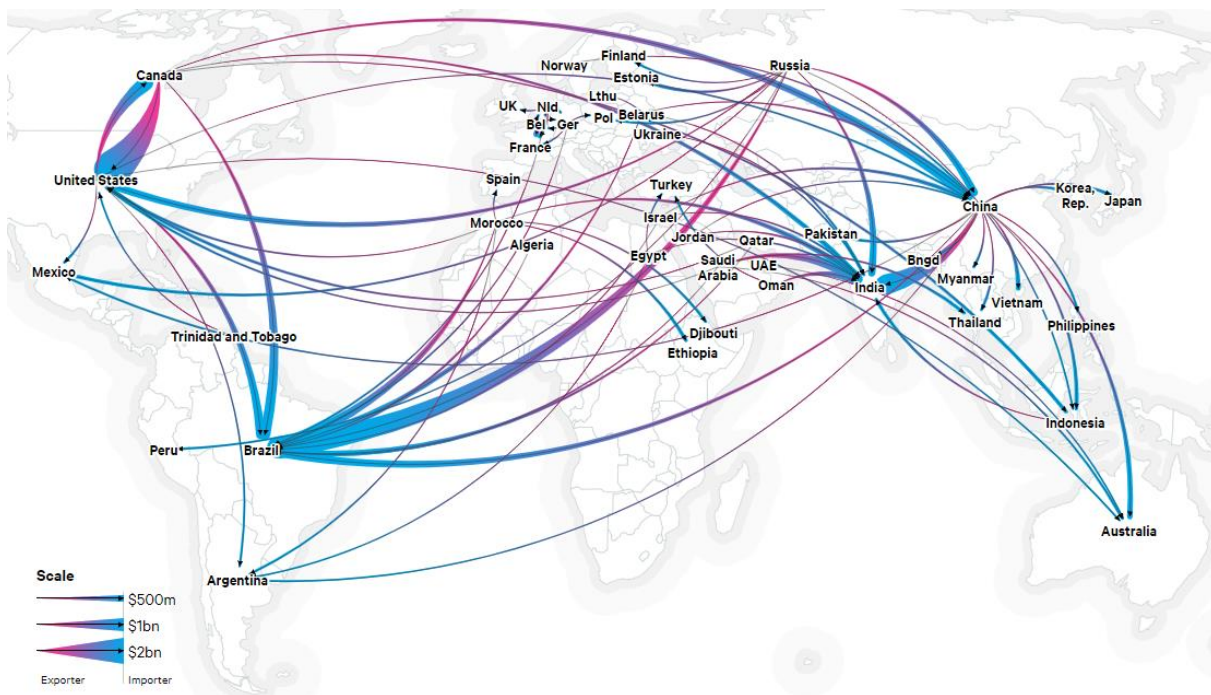
However, the recent fall in fertilizer prices can be attributed to new information indicating that the loss of Russian and Belarusian fertilizer exports will not be as detrimental as was expected at the beginning of the invasion in February. For one thing, although Russia announced restrictions on fertilizer exports until June 2022, it is unclear whether these restrictions have been put into effect. Russia has stopped publishing trade data but countries such as the United States and Brazil have reported Russian imports of fertilizers (USDA-FAS, 2022). Additionally, as international sanctions begin to bite, foreign currency is of increasing value to Russia as it tries to sustain its war effort. But, on the other hand, there was also the

reintroduction of Chinese fertilizers to the world market, which greatly increased the global supply.

Other factors have also diminished the global impacts of Russian restrictions on fertilizer exports. Demand for fertilizer increases at certain times of the year as different regions enter the growing season. The timing of the Russian invasion and subsequent fertilizer restrictions was fortuitous in that the application of fertilizer is not needed until June when the growing season begins in South America, although fertilizer purchases do need to be made sooner. The inherent delay between the purchase and application of fertilizers enabled South American governments and farmers to look for alternatives to Russian fertilizers.

In Argentina, much of the application of granular fertilizers is done between June and August, with purchases in February or March, while for early maize the largest volume of purchases is made in June and

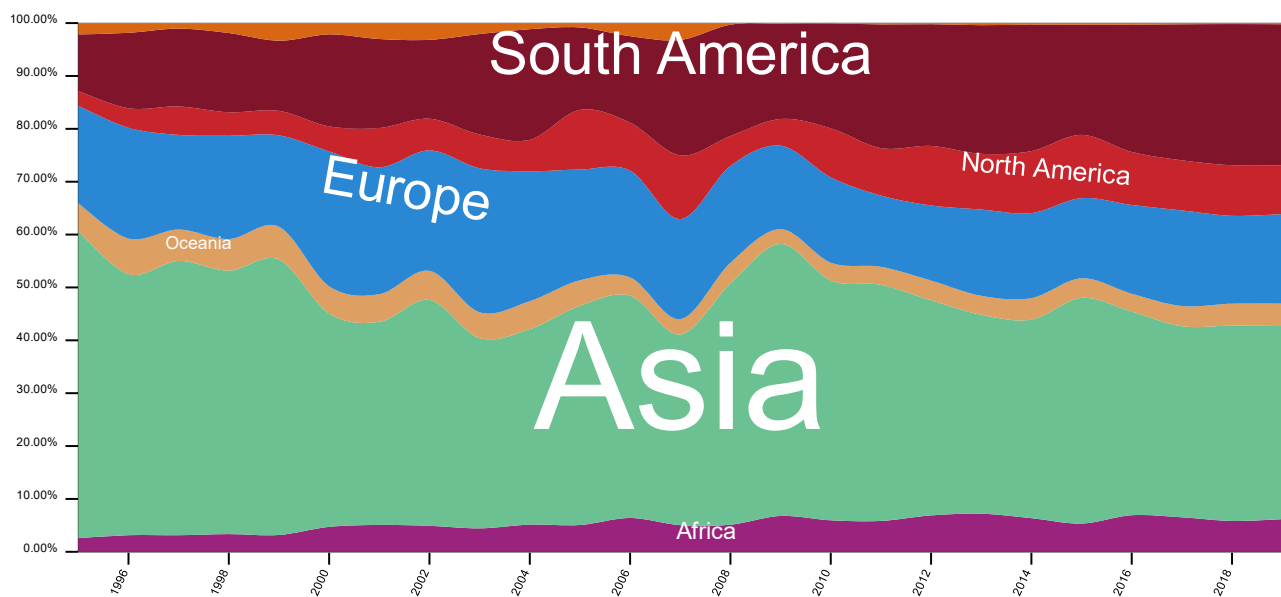
FIGURE 3: MAIN FERTILIZER TRADE FLOWS – 2020 – USD



Source: Buenos Aires Grain Exchange based on resourcetrade.earth



FIGURE 4: SHARE OF WORLD FERTILIZER IMPORTS – VALUE



Source: Atlas of economic complexity

July. Purchases of liquid fertilizers can be made later in the growing season.

Another factor to consider in the case of soybean production, one of the largest agricultural exports in South America, is that soybeans perform biological nitrogen fixation (FBN). It is a biological process by which, through the symbiosis between legumes and bacteria of the rhizobium genus, atmospheric nitrogen from the air is fixed into assimilable nitrogen for plants, so it does not require additional nitrogen fertilizers.

Given all of the facts, it is clear that the dramatic increase in fertilizer prices was a market overreaction that does not reflect the realities of the global fertilizer sector. Jennifer Willis-Jones, senior nitrogen markets editor at CRU – a global commodity market analyst company – said “The market has been reacting to psychological worry, rather than a huge disruption to supply and demand”. (Sleigh, 2022). However, it is important to note that the longer the war in Ukraine continues, the greater the effects will be for the fertilizer market and the agricultural sector as a whole.

Local Market

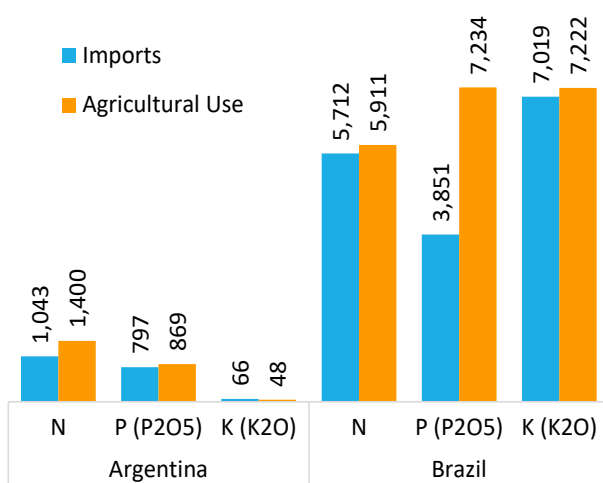
The recent fluctuations in fertilizer markets are observed with great concern in South America, given its need to import large quantities of these inputs for agricultural production, which can be seen in the trade flows in Figure 3. In addition, the trend towards increased importation in the subcontinent is evident in Figure 4.

For example, analyzing fertilizer markets in Argentina and Brazil reveals the extent to which both countries depend on imports to satisfy the fertilizer needs of their respective agricultural sectors (Figure 5).

All told, Argentina consumed 5.3 million tons of fertilizers in 2020, of which 56% were nitrogen fertilizers, 38% phosphates and 6% sulfur. Argentina’s three main crops: corn, wheat, and soybean account for 72% of all fertilizer utilization (ReTAA - Cereal Exchange, 2022); fertilize 2022). Furthermore, about 65% of all fertilizers used are imported, with China, Egypt, Morocco, and the USA being the main suppliers.



FIGURE 5: FERTILIZER MARKET BY NUTRIENT 2020 – THOUSAND TONS



Source: Grain Exchange based on FAOSTAT

The remaining 35% of Argentina's fertilizer consumption comes from the domestic industry. Within the domestic industry there is significant market consolidation, with the top ten companies representing 75% of the total market share. The domestic fertilizer industry is heavily concentrated in the production of nitrogen-based fertilizers.

In recent years, the domestic industry has experienced remarkable growth. Since the year 2000, consumption of domestically produced fertilizer has increased by 650%, dwarfing the 90% increase in imported fertilizer consumption over the same time period.

Although fertilizer consumption has increased dramatically over the last decades, Argentina remains far behind other major agricultural producing countries in terms of fertilizer consumption. According to the World Bank, Argentina ranks 111th in the world in fertilizer application per hectare of arable land. Fertilizer application varies dramatically by region in Argentina, but on average the amount of fertilizer applied only meets 46% of total crop fertilization needs. Several factors help to explain this disparity

relative to other countries. For one, Argentina's soils are endowed with high levels of nutrients, allowing for high yields despite low rates of fertilization. Secondly, grain export duties and restrictions reduce the price received by the producer and distort relative prices, adversely affecting input-output relations. Another institutional factor is the prevalence of annual leases of agricultural land that reduce incentives to invest in fertilization and nutrient replacement.

The war between Ukraine and Russia has created serious instability in agricultural markets in general, but Argentina is in a unique position to take advantage of the situation and establish itself as a global agricultural power. However, the rise in fertilizer prices poses a major challenge to the application of these inputs, given the disincentive generated by a worsening of input-output ratios.

For example, Table 1 shows that in the case of maize, Argentina needs to export 30% to 39% more grain in July to buy the same amount of fertilizer as last year.

TABLE 1: ARGENTINA – INPUT-PRODUCT INTERANNUAL PERCENTAGE CHANGE (2022 VS. SAME MONTH 2021)

	June		July	
	DAP	Urea	DAP	Urea
Soybean	+35%		+41%	
Wheat	+5%	+10%	+4%	-3%
Corn	+36%	+43%	+39%	+30%

Source: Grain Exchange based on AACREA. The % indicate how much more product is needed to buy one ton of the input.

In the current context, the low levels of fertilization in the Argentine agricultural sector mean that, compared with other countries, Argentina would be much less affected by restrictions and instability in the fertilizer market.

Moreover, given that only about 10% of its fertilizer imports come from Russia, it has greater flexibility to replace such purchases than other countries. In any



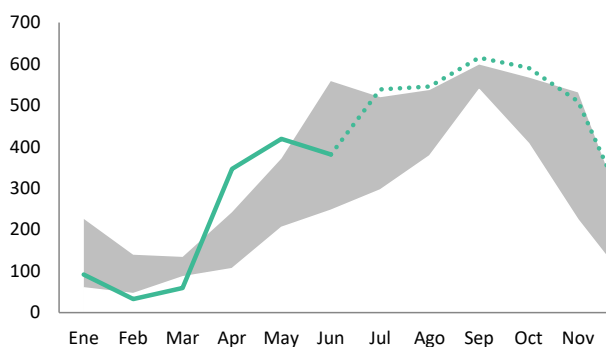
case, it is important to highlight the negative effects of less fertilization on the yields and quality of the grains obtained, as well as on the care of the soils. Therefore, policies that favor fertilizer application and close technological gaps between producers are even more relevant in the current context, in order to take advantage of Argentina's potential for sustainable yield growth.

Local challenges

In addition to the issues arising from volatility in international markets, Argentina is faced with a shortage of foreign currency. The Central Bank (BCRA) set quotas for access to the exchange market for imports in March, dictating that fertilizers could be imported for an amount equivalent to the lower of: 2021 FOB imports plus 5%, or 2020 FOB imports plus 70%, prorated per month, with the possibility of increasing up to 20% of the annual quota.

At the start of the year, this quota did not translate into a real constraint due to the strong seasonality of

FIGURE 6: MONTHLY FERTILIZER IMPORTS AND PROJECTIONS* TO THE REST OF 2022



Source: Buenos Aires Grain Exchange based on INDEC's data. The shaded area represents the max and min between 2018 and 2021. *Projections based on average amount in 2020 and 2021, and average prices of 2022, assuming that there are no foreign currency restrictions.

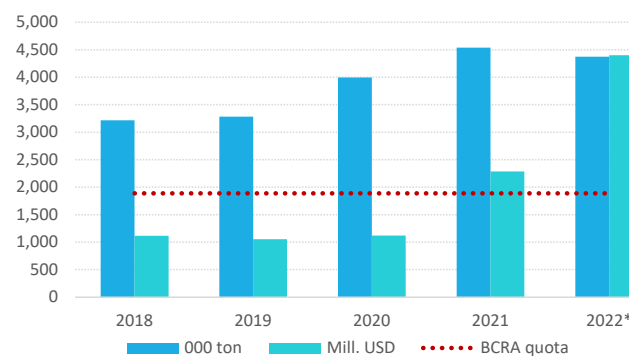
² As a methodological note, it is mentioned that the quota calculated here was estimated at the tariff position level, when in practice the measure is applied at the enterprise

fertilizer imports for Argentina's production system. Figure 6 shows that the highest volumes during normal years are expected between June and November. Taking the average quantities for 2020 and 2021, and considering the prices observed up to June 2022, imports for the rest of the year are projected above historical highs.

Figure 7 shows the volumes and values imported historically, as well as those projected for the total of 2022 (projected Jul-Dec). This projection, which could be characterized as an extreme scenario, assumes that quantities equal to the average 2020-2021 would be imported at the average prices for the months January-June of this year. Beyond the growth in the volume of imported fertilizers, it is clear that the prices of 2021 and 2022 implied a considerable jump in the amounts of dollars needed.

Figure 7 also shows that the annual BCRA quota estimated at 1.89 billion, is not only significantly lower than the projected value of imports for 2022 (US\$4.4 billion), but it would also necessitate a reduction of imports to levels even lower than those observed in 2021 (USD 2.29 billion).²

FIGURE 7: HISTORICAL AND PROJECTED* FERTILIZER IMPORTS



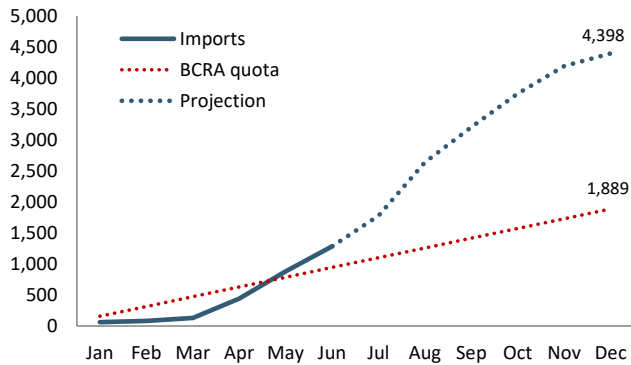
Source: Buenos Aires Grain Exchange based on INDEC.

level. The exercise is equally illustrative of the problems facing it.



A monthly breakdown of the situation in 2022 can be seen in Figure 8. It is worth noting that, if the cap were fully operational, 57% of import needs would remain unmet at the end of the year.

FIGURE 8: HISTORICAL AND PROJECTED* FERTILIZER IMPORTS FOR 2022



Source: Buenos Aires Grain Exchange based on INDEC.

Analysis of Alternative Scenarios

Based on the above figures, it is clear that restrictions on imports of key inputs for the agro-industrial sector could become a major constraint on production and potentially increase foreign exchange restrictions in the future if production is reduced by lower fertilization. However, it is interesting to analyze what would happen in extreme alternative scenarios, to evaluate the sensitivity of the results shown here.

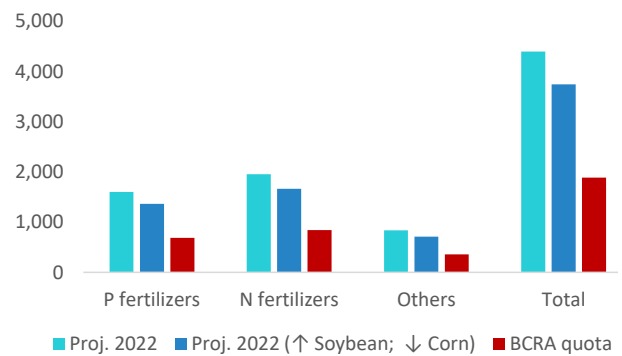
The first scenario considers the fact that fertilization requirements per hectare are lower for soybeans than for corn. In fact, according to data from the 2020/21 Applied Agricultural Technology Survey (ReTAA), maize used 71 kg of nitrogen per ha, and 14 kg of phosphorus, while the figures for soybeans were zero and 6, respectively.

Figure 9 shows the hypothetical case for the 2022/2023 campaign in which 3 million fewer hectares of maize are planted and are replaced with increased soybean production. Even in this extreme scenario, fertilizer imports totaling 3.74 billion would be required, which is 656 million less than in the base scenario. Yet

even this drastic reduction would still exceed the BCRA ceiling by 98%. It is worth noting that this change in the production mix would imply a lower foreign exchange income from grain exports of 1.35 billion dollars, which would imply a net loss in the commercial balance of payments.

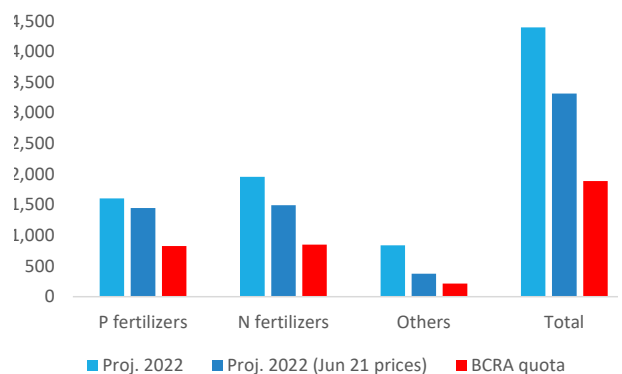
The second alternative scenario considers the fact that fertilizer prices recently experienced a decline, a trend that could continue. Thus, averaging 2022 prices could be overestimating the values of imports in the second half of the year. Thus, Figure 10 shows the value of imports projected for 2022, keeping prices for

FIGURE 9: FERTILIZER IMPORTS BASED ON HARVESTED AREA SCENARIO (MILL. USD)



Source: Buenos Aires Grain Exchange

FIGURE 10: FERTILIZER IMPORTS BASED ON PRICE SCENARIO (MILL. USD)



Source: Buenos Aires Grain Exchange.



the remaining months (July to December) at June 2021 prices. While this implies a decrease in value from the first scenario, the amounts imposed by the BCRA are still greatly exceeded.

In fact, for imports to reach the BCRA limit without compensating via reductions in quantities, prices of imported fertilizers would need to fall, on average, an additional 58% from the prices observed in June 2021.

A third possible scenario, not analyzed here, would imply an adjustment in the applied amounts of fertilizers per hectare, given the most unfavorable input-output ratio. In practice, one would expect a combination of these effects, including falling prices and quantities, which could lead to import requirements at values somewhat lower than those presented here, although still well above the permitted limits.

New Government policies

To alleviate the situation, the BCRA has taken measures aimed at giving more flexibility to imports.

In particular, “the period for access to the exchange market for paying inputs to be used for the local production of goods to be exported was reduced from 365 to 60 days, when advances or pre-financing of exports were simultaneously settled” (BCRA 7/7/22).

The changes enable the use of export pre-financing, so that companies that are grain exporters can use the mechanism to import inputs, or for companies that manage to obtain 60-day financing.

Usually, the fertilizer import market is based on spot operations, without credit, so there are concerns about the volume of business that could take advantage of this exception.

Final comments

In addition to raising these issues, the work in the coming months must include a careful monitoring of

these markets, given the recent volatility, to guarantee a swift reaction by actors in the supply chain and policy makers.

Based on the figures analyzed, not giving priority to the difficulties that currently exist in fertilizer markets is a mistake that can translate into less availability of foreign exchange due to the potential impact on production.

Although the production characteristics in Argentina give it some room for maneuver in the context of volatile international input prices, the consequences that such management could have in the medium term regarding the effects on sustainability, both productive and environmental, cannot be ignored.

Less fertilizer application can not only lead to reduced yields but also to negative nutrient balances in the soil (more is extracted than is incorporated). Nutritional imbalances lead to the degradation of native soil fertility, exemplified in the marked decreases in organic matter and drops in productivity (García, 2006).

Additionally, crops such as wheat, barley, and corn require the incorporation of nutrients via fertilization for their growth and development. Therefore, the high prices of inputs and disruptions in supply chains can cause distortions in crop rotation schemes.

Finally, Argentina has an enormous potential to increase yields per hectare in a sustainable manner by closing technological gaps where fertilization is an essential component (Bolsa de Cereales, 2019 and 2020).

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