

# Input assurance for Brazilian food production

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The necessity to feed more than 210 mn inhabitants and to promote economic and social development makes agriculture one of the most important economic activities in Brazil. Fertilizers are important inputs for the agribusiness chain, but Brazil imports more than 80% of the fertilizers it needs. Many recent projects that aimed to expand fertilizer production in the country have been abandoned. The recent COVID-19 pandemic has caused disruptions in global value chains – food included. In this context, is Brazil's food production at risk in the long term?

## Food production and the fertilizer industry

The success factors verified in Brazilian agribusiness are connected to the availability of natural resources, the technology development, the public policies, the sector's entrepreneurship and the value chains organization. Continuous advance of productivity and efficiency heightens the role of agribusiness in reducing poverty in Brazilian society.

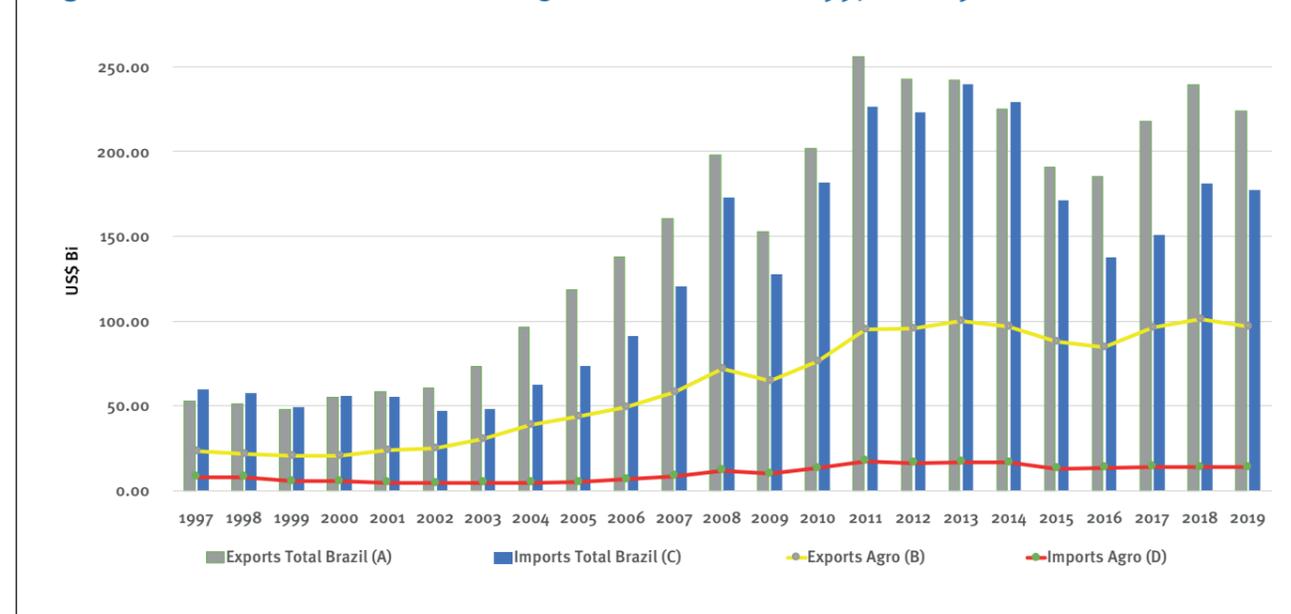
In December 2019, agribusiness employed around 18.25 mn Brazilians. In 2017, it was estimated that just family farming employed 10.1 mn people in Brazil. Without agribusiness, Brazil would record recurring deficits in its trade balance (see figure 1).

Fertilizers and crop nutrition play a key role in the achievement of Goal 2 (No Hunger) of the 2030 UN Sustainable Development Agenda because they contribute to 50% of the world's food production. Fertilizer use also forestalls deforestation. Brazil is the fourth largest consumer of fertilizers in the world, but its imports of NPK fertilizers, as a percentage of its total fertilizer consumption, have risen from 32% in 1988 to 77% in 2018. In 2019, it is estimated that imports exceeded USD9 bn (see figure 2).

Although soy, corn, and sugarcane account for more than 70% of the consumption of fertilizers in the country, the cost of grains largely consumed in Brazil (such as rice and beans) is significantly impacted by fertilizer input. In the case of rice family farming in Eldorado do Sul (Rio Grande do Sul), the cost of fertilizers was higher than 26.0%

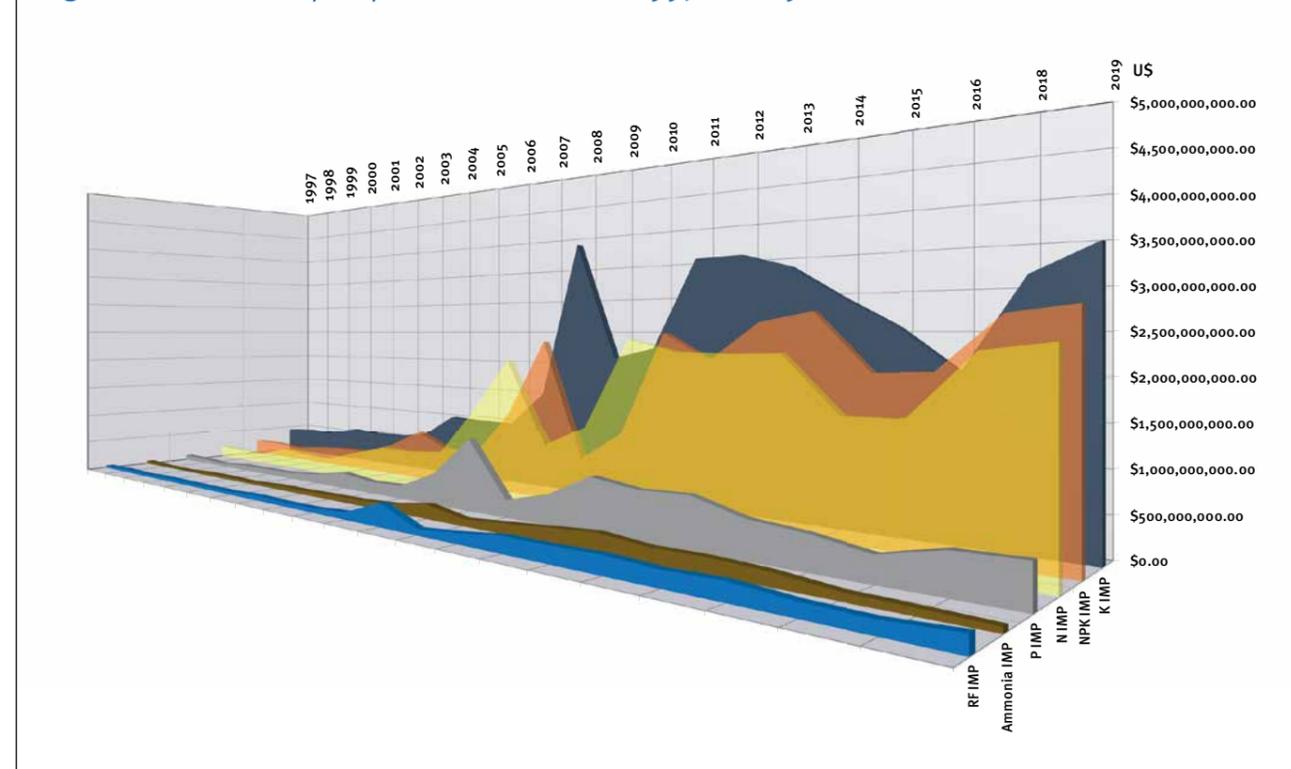
of the variable costs of production and higher than 19.3% of the total cost of production. In the case of bean family farming in Prudentópolis (Paraná), the cost of fertilizers was higher than 30.4% of the variable production costs and higher than 26.8% of the total production cost in the same year. This scenario is even more critical when the dollarization of national price of fertilizer is compared with the price formation of beans and rice in Brazil in Brazilian real terms. This disproportional relation is a relevant factor that influenced the elevation of price to consumers of these products in 2020, in addition to the COVID-19 effects. Products historically destined to supply the domestic market still have a large gap for productivity gains, but they are more susceptible to the price volatility of agricultural inputs. In addition, most of the family farmers in Brazil do not use fertilizers on cereal, common bean, rice and maize production. The consequence is a low productivity of these products (Maize = 2,500 t/ha and common bean = < 1,000 t/ha), even though the productivity of the agribusiness is 5,500 t/ha and 2,200 t/ha, because the use of fertilizers and lime. So, the Brazilian

Figure 1. Brazilian Trade Balance and Agribusiness between 1997 to 2019 Source: MAPA (2020)



## Many recent projects that aimed to expand fertilizer production in the country have been abandoned

Figure 2. Fertilizer import profile in Brazil from 1997 to 2019 Source: COMEXTAT (2020)



food production and food security is dependent of a programme that aims to promote the use of fertilizers and minimize the dollar dependence in Brazil's fertilizer price.

### Government policies

The international market price of the major foods has grown at unusual rates since 2000, reaching historic highs in 2008 and world prices for nitrogen, phosphorus and potassium fertilizers increased by more than world prices for rice, wheat and maize. At the same time, Brazilian fertilizer consumption declined. The increase in the price of fertilizers boosted the reduction in the world consumption of these agricultural inputs. While the demand for nitrogen remained practically inelastic, there was a great reduction in the demand for phosphorus and potassium.

In this context, the Brazilian government established public policies to expand fertilizer production such as the reappraisal of research and mining authorizations for phosphate and potassium, investment in prospecting in areas with phosphate potential and the expansion of ammonia production from pre-salt natural gas. Between 2010-2015, there were ongoing projects (greenfield and brownfield) in order to expand Brazilian fertilizer production, but the Brazilian basic fertilizer supply in 2019 was lower than in 2003. Currently, factors that hinder the expansion of the fertilizer industry in Brazil are related to:

- Inefficient logistics infrastructure - the mineral extraction stages face the same difficulties as most of the national mining industry, usually located in remote areas and with the need for self-development of the logistical structure
- Low competitiveness of natural gas
- Ongoing de-industrializing
- High cost of credit
- Phosphate deposits predominantly with low phosphate content
- Potash deposits in environmental sensitivity areas

### Securing the food supply chain

The pandemic caused by COVID-19 is already affecting the world fertilizer industry. The current panorama faces effects such as the difficulty of economic slowdown, access to fertilizers (credit availability), energy price volatility, recession in key markets, disruption in transportation, labour shortage and trade restrictions. However, agricultural inputs tend to be less affected by the pandemic than those related to industrial activities. Even more recently, a tragic event hit the fertilizer industry. On 4 August 2020, an explosion in Beirut (Lebanon) caused hundreds of deaths and thousands of injuries. According to preliminary assessments, this accident is associated with the improper storage of the fertilizer ammonium nitrate. Although the control of these crop nutrients is already strict, this event has the potential to cause deleterious effects on the fertilizer industry. Historically, accidents of this magnitude have tended to lift trade restrictions and safety barriers.

The Covid-19 crisis has increased the number of home-cooked meals in Brazil and the consumption of rice and beans has increased. The boom in the price of rice (19.25% in 2020) impacted the budget of vulnerable families. This event led to the Brazilian government removing the import tariffs on rice. However, this measure, which aims to balance the conjunctural conditions of supply

and demand, has no structural consequences on increasing reliability in the food supply chain.

### Outlook and solutions

The occurrence of COVID-19 is likely to deepen the global economic slowdown seen in recent years. It may promote the maintenance of global fertilizer consumption at low growth levels - the fertilizer industry can lose attractiveness and it can cause installed capacity reduction in Brazil. Accident in Beirut probably will affect the fertilizer industry in a negative way.

In the possible future event of high fertilizer prices, Brazilian agriculture may reduce the consumption of fertilizers (as occurred in the 2000s) and possible negative impacts include the loss of agricultural productivity, the expansion of cropland area and high food prices. Therefore, the Brazilian government should implement a policy of incentives to expand the current fertilizer production capacity. In addition, the Brazilian government should implement a policy of incentives to optimize the use of fertilizers, avoiding waste of nutrients and environmental damages.

This could be addressed by the government running a programme that encourages the use of fertilizers by family farmers to increase economic and environmental sustainability. In order to better understand the plausible futures, it is recommended to develop long-term prospective scenarios for the Brazilian Fertilizer Industry. ■

#### About the authors

Pedro Veillard Farias is a specialist in building prospective scenarios for the chemical industry. He also holds the position of titular researcher at Brazilian Patent and Trademark Office. Adelaide Antunes (Emeritus professor at UFRJ), Senior Specialist at Brazilian Patent and Trademark Office) and Estevão Freire (Professor at UFRJ) conduct research in the field of management and technological innovation in the chemical industry. Armando Cunha (Professor at UFRJ) is interested in inorganic technology research. Jose Polidoro is an agronomist at Embrapa Solos and he currently coordinates at the Brazilian Soil Survey. They all hold a PhD degree.

*Note: Compliance with ethical standards. The authors declare that there is no conflict of interest. The full journal with references is available from the author: pedro.veillard@eq.ufrj.br*

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