AgriSustainability Matters

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Ambassador's word

Dear friends,

Because of its nutritional qualities and high productivity, soy has been gaining ground in the food chains and global trade. It is a primary agricultural raw material in the production of meat, fish, milk, and other foods consumed in all continents, and present in everybody's daily food. As such, adequate soy supply is a concern that affects all countries and takes on a central role in world food security.

Soy farming has expanded in Brazil against all odds; it has been necessary to resort to much science to adapt the soybean seed to the Brazilian weather and soil conditions. Since the 1970s, the Brazilian Agricultural Research Corporation, Embrapa, has been developing research programmes aimed at increasing productivity and sustainability in soy production in Brazil. Thanks to the joint efforts of researchers and farmers, Brazil today is the largest soy producer and exporter in the world.

The success of the soy crops in Brazil has given rise to fears that the production of this oilseed might affect the native vegetation in Brazil, which, it is worth pointing out, still covers an impressive 66.3% of the territory of Brazil. In this edition of AgriSustainability Matters, a group of researchers of the renowned Embrapa Soybean -therefore the best-qualified experts to deal with this matter- explain the reasons why such fears are unfounded. On the basis of the evidence of data and compelling explanations, the authors show that Brazil is the best-qualified country in producing soy sustainably; as such, it is in the interest of the world that not only does Brazil maintain, but also expand the production of this essential foodstuff.

The Brazilian soybean is far from being an environmental villain. Quite the contrary, it is an invaluable contribution to global food security. As much now as ever, AgriSustainability Matters.

Enjoy the reading.

Fred Arruda
Ambassador of Brazil to the United Kingdom

Brazilian soy is not the environmental villain

Alexandre Nepomuceno
Research Director of Embrapa Soybean

Co-authors:
***Alvadi A. Balbinot Júnior*, R&D Officer**
***Carina F.G. Rufino*, Head of Technology Transfer**
***Adilson de Oliveira Júnior*, Administrative Officer**
***Henrique Debiasi,* Researcher**
***Marco Antônio Nogueira*, Researcher**
***Amélio Dall'Agnol*, Researcher**

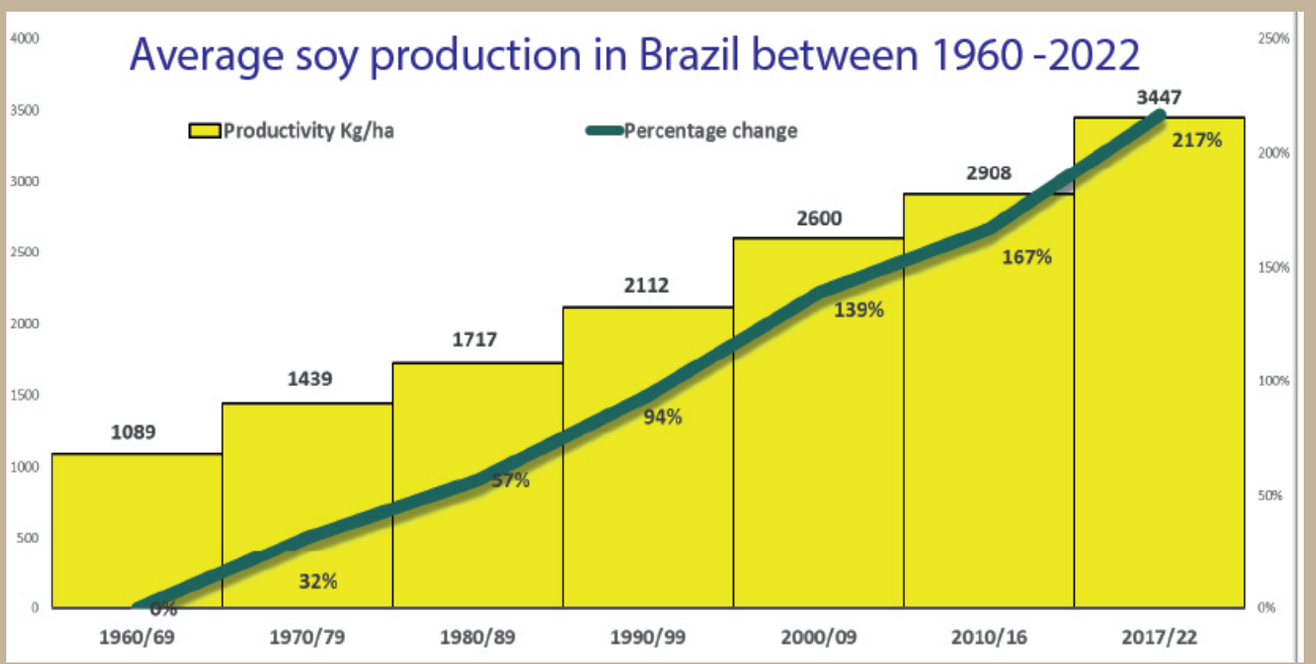
Soy is notably the main source of vegetable protein, used mainly in the production of animal protein (beef, pork, chicken, fish, eggs and dairy products). It is also the second main source of oil for human consumption and biodiesel. This explains why the cultivation and production of this grain has grown so much in Brazil in half a century: to boost the supply of more raw material for the production of meat, dairy products and oil. In 2020, China and the European Union imported more than US$20 billion and US$6 billion, respectively, of soybean grain and meal from Brazil for use in the production of meat, eggs, milk and other by-products. Soy is the cheapest and most abundant source of vegetable protein on the planet and without the soybean production levels currently obtained by Brazil, Argentina, the USA and Canada, we would be unlikely to achieve the production of high-quality meat-derived protein that we have in the world today.

The spectacular increase in the production of this oilseed in Brazil began in the 1970s. At the beginning of that decade, Brazilian production was a mere 1.5 million tons (Mt) but by the beginning of the following decade it had already reached 15.2 Mt, an upturn of 1,013% over that period. That decade was the turning point for Brazilian agribusiness, not only for soy, but also for all the other agricultural activities in the country, including livestock farming, grains, forest products and fruits, among others. Soy was the driver of this transformation.

The expected soybean grain production for 2021/2022 is 140 Mt, a 93.3-fold increase compared to 1970, for a much smaller increase in the cultivated area, which grew from 1.51 million hectares

(Mha) in 1970 to 40 Mha in 2021/2022; a 26.5-fold increase.

Over this period, productivity rose from 1,144 kg/ha in 1970 to the current 3,528 kg/ha, which is the result of the ongoing creation and enhancement of soy production technologies obtained through research and adopted by farmers. Over the past 25 harvests, soybean productivity in Brazil has recorded an average annual growth rate of 47 kg of grains/ha.



Source: Conab (2021) and Ministry of Agriculture, Livestock, and Supply (MAPA) -2021

It is worth pointing out that, if the 1970 productivity levels had been maintained, we would need 93 Mha, rather than the existing 40 Mha, to obtain the current yields (140 Mt). This shows that 53 Mha were saved from potential deforestation in half a century. In addition, for the last two decades, there has been a consolidation of intensified production systems, such as soybean-corn succession, increasing food production in a given area. These advances in productivity and production systems aimed at sustainable intensification place Brazil at the forefront of world soy production.

The improved productivity, which reduced the need to use additional arable land, resulted from the development of technologies adapted to tropical regions, which are predominant in Brazil. Such technologies enabled, among other advances:

1. The development of a tropical soybean, adapted to low-latitude regions, thereby increasing the areas suitable for planting;

2. The chemical correction of acidic and infertile soils in tropical savannas, making them fertile and highly productive;

3. The adoption of No-Till Farming, which reduces soil erosion and fuel consumption, preserves soil moisture and nutrients and increases the organic matter content, sequestering carbon in the soil, among other benefits;

4. The large-scale use of the integrated crop-livestock-forest system, which enables alternating agricultural activities with livestock and forests, thus benefiting all activities - an example of sustainable intensification;

5. The early planting of soybean due to the development of short-cycle varieties, less sensitive to changes in the number of daylight hours, depending on the distance of the planting area from the equator and the time of year. As a result, it is possible to bring forward soy harvest and introduce a second crop of corn or cotton, in a given area and crop year;

6. The use of biological nitrogen fixation (BNF), which eliminates the need for mineral nitrogen fertilizers in soybeans, drastically reducing production costs and emissions, particularly those of nitrous oxide, one of the most polluting greenhouse gases (GHGs). According to estimates, the supply of nitrogen to soybeans via biological fixation as a substitute for nitrogen fertilizers prevented the emission of 205 Mt of CO_2 equivalent in the last harvest.

However, there are still problems to be solved. It is undeniable that deforestation is still taking place, although not necessarily for the cultivation of soybean, whose territorial expansion has been largely due to the use of degraded pastures and as a trade-off with other crops, especially corn, which gave way to soybean in the spring sowings and began to be predominantly cultivated as a second summer crop, after soybean harvesting. As a matter of fact, this second crop has become the main crop of this cereal in Brazil.

Unfortunately, a distorted view still prevails among part of the international – and even national – community, who seem to believe that the increased soybean production area in Brazil is a result of the deforestation of the Amazon rainforest, which is simply not true. Illegal deforestation has certainly taken place, but it has been caused mostly by land-grabbers, gold-miners and loggers, in violation of Brazilian environmental legislation, which is one of the strictest in the world. Soybean cultivation in the Amazon biome represents around 13% of the 40 Mha of soybean cultivated in the country, but it has been undertaken mainly to recover degraded pastures.

Restrictions have been imposed by public and private organisations to curb these practices, such as the “soy moratorium”, a private initiative which, since its establishment in 2006, has prevented the trade of soybean cultivated in deforested areas; or Embrapa’s “Low-Carbon Soy”, which offers guidance on the best agricultural practices to reduce GHG emissions and increase carbon sequestration in the soil. In spite of such restrictions, there are still some occasional problems that need to be solved, but it would be unfair to tar the entire production of Brazilian soybean and sporadic illegal activities with the same brush.

At COP 26, Brazil signed a commitment to reduce GHG emissions by 50% by 2030 and become a carbon-neutral economy by 2050. Science makes it possible to foresee challenges and anticipate alternatives that may expand the role of Brazilian agriculture as a driver for solutions and not as a problem that causes climate change.

In order to fulfil this commitment, the Sectoral Plan for Adaptation and Low Carbon Emission in Agriculture and Livestock, known as ABC+, is currently underway. It aims to reduce the carbon equivalent emissions in the agriculture and livestock sector by 1.1 billion tons by 2030, by encouraging compliance with environmental legislation, an increase in biodiversity and the adoption of several GHG mitigation technologies developed and validated by research. One of its targets is the reclamation of 30 Mha of degraded pastures, mainly using Integrated Crop-Livestock-Forest systems (ILPF). The area recovered with these systems already corresponds to more than 17 Mha and is expected to exceed 30 Mha by 2030. Further ABC+ Plan targets to be reached by 2030 include the expansion of the areas employing technologies such as no-till farming (+12.5 Mha), ILPF systems (+10 Mha) and bio-inputs (+13 Mha). Together they have the potential to reduce GHG emissions by more than 70 Mt of CO2 eq/year by 2030.

It is worth noting that Brazil is a key player in the development and use of bio-inputs, particularly nitrogen-fixing bacteria (Bradyrhizobium spp.) which, when inoculated into soy seeds, absorb nitrogen from the air, thus preventing the release of millions of tons of chemical nitrogen fertilisers into the soil, given that 80 kg of nitrogen are required to produce one ton of soy. For a yield of 3,500 kg, therefore, 280 kg are required and this nitrogen can be made available mainly through inoculation. The vast majority of Brazilian farmers inoculate soybeans, avoiding mineral nitrogen: it is much cheaper and protects the environment. It is worth emphasizing that other soybean producing countries have opted for soybean cultivars with a greater response to fossil-based nitrogen fertilisation, and have only recently started adopting BNF technology.

Brazil is also a world leader in the preservation of soil fertility through the adoption of no-till farming, which currently occupies an area of more than 33 Mha. When used in accordance with its premises (minimum disturbance, permanent soil cover and diversification of plant species), no-till farming reduces water and soil losses by erosion, thus preserving these important natural resources. In addition, it improves the efficiency of water and fertilizer use, with a consequent reduction in production costs, environmental impacts and productivity losses due to drought; and it increases the organic matter content, contributing to improving the fertility of tropical soils and sequestering CO2 from the atmosphere. The economic, social and environmental benefits of no-till farming are even greater when this technique is used in conjunction with the ILPF system, a technology that has rapidly

expanded in the country and provides increased production per area and lower GHG emissions, in addition to preserving biodiversity, soil and water.

Another ongoing initiative to improve the sustainability of Brazilian agribusiness is the PronaSolos Programme, recently established by the Brazilian Ministry of Agriculture, Livestock and Supply (MAPA). Over the next three decades, PronaSolos will mobilize dozens of partner institutions in the fields of research, documentation, inventory and interpretation of Brazilian soil data. Brazil has 36 billion tons of organic carbon stored in its soils, which corresponds to 5% of the global stock. The investment in soil science has been fundamental to transform this natural resource and turn Brazil into a world leader in tropical agriculture. Although the soil composition of only 5% of its territory has been mapped and assessed, Brazil is already the greatest agro-environmental power in the world.

There are several ongoing initiatives seeking to show and attest to the good practices adopted by Brazilian soy producers. In this context, Embrapa Soybean is proposing the creation and implementation of a concept-brand ("seal"), designated as Low-Carbon Soy (LCS). The LCS brand identifies soybeans coming from no-till production systems characterized by the adoption of a set of good agricultural practices that, in the light of accumulated scientific knowledge, result in the reduction of GHG emissions while maintaining or increasing productivity. The process of granting the seal will be structured through private, voluntary, third-party certification, following a measurable, reportable and verifiable (MRV) control system, in accordance with internationally recognised standards and protocols. The LCS brand should be available to the market within two years and will certainly stimulate the use of sustainable practices in soybean production, providing a distinct advantage and adding value to the grain.

In addition to the advances mentioned above, it is worth drawing attention to the investments and achievements in the area of phytosanitary protection, particularly with regard to the integrated management of insect-pests, diseases, nematodes and weeds. The management of these biotic stresses is crucial for the sustainability of soy cultivation in a tropical country like Brazil.

It is now urgent to show the world the importance of the sustainable Brazilian food production system, which has low GHG emissions and no government subsidies, as opposed to many developed countries that criticise our production. Existing policies restricting agricultural trade result in the displacement of agricultural production from high productivity areas to less productive regions, with higher costs and often heavier use of chemical fertilisers. This solution is neither sustainable nor desirable from a social and economic point of view. According to the UN, our planet will reach a population of 9 billion people in 2030. It is in the world's best interest to ensure that Brazil not only maintains

its production but also increases it in a verticalised manner, boosting productivity and sparing land and other resources. The production of quality food in large quantities to meet global demand is crucial for the quality of life, health, well-being and, above all, peace on our planet.

Soy crop in Brazil using the techniques of no-till farming and biological nitrogen fixation. Source: Embrapa

+44 020 7747 4500
agriculture.london@itamaraty.gov.br
londres.itamaraty.gov.br
14-16 Cockspur St, St. James's, London SW1Y 5BL

EMBASSY OF BRAZIL LONDON