

## Ambassador's word

Dear friends,

As governments from across the world prepare to gather in Glasgow for COP26, I am delighted to bring you the sixth issue of AgriSustainability Matters, featuring the piece “The Brazilian Way: A Sustainable Development Model for Agriculture and Livestock Farming”, by Brazilian agricultural engineer Dr Angelo Costa Gurgel.

Dr Gurgel, currently a research scientist at the Massachusetts Institute of Technology (MIT), discusses the successful Brazilian experience in low-carbon agriculture. He begins by presenting one of the major challenges of our time — to reconcile the demands of a growing population with the need to preserve the planet's stock of natural resources and biodiversity. He then goes on to show how Brazil has responded to that challenge through “ABC Agriculture”, as we have come to call a set of practices and techniques developed to reduce or even sequester greenhouse gas emissions stemming from agriculture and livestock farming.

Dr Gurgel's piece adds relevant information and insight to the story that AgriSustainability Matters has been telling us issue after issue: the story of how, thanks to consistent scientific advances and extraordinary productivity gains, in the past 40 years Brazil has gone from being a food importer to one of the world's largest exporters of sustainable agricultural products.

In Brazil, innovation has proven key to agrisustainability. And agrisustainability matters.

Fred Arruda

Ambassador of Brazil to the United Kingdom



## The Brazilian Way:

A Sustainable Development Model for  
Agriculture and Livestock Farming

Angelo Costa Gurgel

Societies across the globe face a huge challenge: to generate the necessary means for a growing population, which is heading towards eight billion inhabitants, securing for them decent living conditions and access to food and energy, while preserving the planet's stock of natural resources and biodiversity for future generations. To this end, the issues to be tackled include malnutrition and hunger, social inequality, climate change and extreme events, pollution and environmental degradation, loss of biodiversity and water scarcity.

So many inter-related issues require continuous and profound transformations of the social and economic development models adopted thus far, which include changes in aspects ranging from production processes to the consuming habits of individuals.

In this context, it is worth highlighting the continuous development of a set of practices and techniques in Brazilian agriculture and livestock farming, defined as “low-carbon agriculture”. Also known as “ABC agriculture”, they include: no-tillage, recovery of degraded pastures, integrated crop-livestock-forest production systems (which combine crops, livestock and/or forests in the same area), agroforestry systems, biological nitrogen fixation, animal waste treatment and forest planting. These practices and techniques reduce or even sequester greenhouse gas emissions compared to more conventional approaches. Moreover, they enable increased efficiency in the use of natural resources (land, water and nutrients), biological diversity in agricultural areas and productivity gains, in addition to improving the resilience of agricultural production systems to bad weather and adverse climate events. They therefore contribute to the adaptation of agriculture and livestock farming to climate change. Higher productivity and lower climate risk, in turn, increase the incomes and socioeconomic conditions of rural producers, furthering the sustainable development of agriculture and livestock farming. In short, ABC agriculture synergistically combines the need for environmental conservation and socio-economic development, in line with the broader concept of sustainability.

The dissemination of these practices and techniques in the Brazilian agricultural scene is already a reality. They contribute to global food security and, more generally, to the Sustainable Development Goals, advancing towards net-zero greenhouse gas emissions in the long term. Several of those practices, such as crop-livestock-forest integration, are possible in tropical agriculture conditions, giving Brazil a comparative advantage in relation to other large-scale food-producing nations and allowing the transfer of know-how to other developing nations with a similar climate.

The recognition of the production and the environmental benefits of ABC agriculture has inspired public policies aimed at furthering its implementation. The “Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-Carbon Economy in Agriculture”, commonly referred to as the “ABC Plan”, aims to foster low-carbon agricultural practices and techniques in Brazil. This plan is part of the National Policy on Climate Change, created to fulfil the voluntary commitment made by Brazil at the 15th Conference of the Parties of the UNFCCC (COP15), held in Copenhagen in 2009. The ABC Plan is part of the Brazilian strategy to reducing greenhouse gas (GHGs) emissions in agriculture. Along with all the carbon reduction initiatives, it contributes to the achievement of Brazil’s Nationally Determined Contribution (NDC) goals, agreed to at the 21st Conference of the Parties (COP21), in 2015.

“ABC agriculture synergistically combines the need for environmental conservation and socio-economic development, in line with the broader concept of sustainability.”

More recently, the Brazilian Ministry of Agriculture, Livestock and Food Supply carried out a thorough review of the ABC Plan and launched its strategic vision for the new Sectoral Plan for Adaptation to Climate Change and Low-Carbon Emissions in Agriculture with a view to achieving Sustainable Development, which has come to be known as ABC+. The ABC+ Operational Plan, with its quantitative targets, was officially launched on October 2021.

The targets for ABC Plan’s contribution to the National Policy on Climate Change are based on the mitigation capacity of the different practices and techniques of low-carbon agriculture and on the degree of their adoption by farmers. At the time of its planning, the expected contribution of the ABC Plan to the National Policy on Climate Change was around 16% of the total emissions reduction, corresponding to a mitigation volume between 134 and 163 million tons of CO<sub>2</sub> equivalent. This volume would be achieved by recovering 15 million hectares (ha) of degraded pastures, expanding 4 million ha of integrated systems and 8 million ha of no-till

farming, increasing biological nitrogen fixation by 5.5 million ha, reforesting 3 million ha of planted forests, and increasing animal waste treatment by 4.4 million cubic meters.

Since its inception, the ABC Plan has relied on an important incentive instrument, the ABC Programme, which is a line of financing at attractive interest rates to foster the adoption of low-carbon technologies in agriculture and livestock farming. This credit line enables producers to afford the necessary investments to change the agricultural production model away from traditional forms towards ABC agriculture.

In addition, the ABC Plan and Programme have synergetic effects with other environmental policies, such as the Forest Code and policies to fight deforestation, given that ABC agriculture increases productivity, thereby reducing the size of land needed to produce the same amount of food and creating the so-called “land-saving effect”.

“Sustainable technologies now cover at least 48 million ha in Brazil – twice the size of the United Kingdom.”

According to Manzatto et al. (2020), from 2010 to 2017/2018, around 10.45 million ha of degraded pastures were recovered, reducing emissions by around 40 to 57 million tons of CO<sub>2</sub> equivalent, while integrated crop-livestock-forest systems expanded from 6.78 million ha to 12.61 million ha, generating soil carbon sequestration between 22 and 36 million tons of CO<sub>2</sub> equivalent. No-till farming areas expanded by 12.72 million ha, reducing CO<sub>2</sub> equivalent emissions by 23 million tons, while biological nitrogen fixation grew by 10.64 million ha, mitigating between 18 and 19 million tons of CO<sub>2</sub> equivalent. Planted forest area increased by 1.23 million ha, leading to the mitigation of over 25 million tons of CO<sub>2</sub> equivalent. Waste treatment, in turn, grew by 4.51 million cubic meters, leading to the mitigation of 7 million tons of CO<sub>2</sub> equivalent. Overall, ABC agriculture practices are estimated to have helped mitigate almost 170 million tons of CO<sub>2</sub> equivalent in the period, which represents around 40% of Brazilian emissions from the agricultural and livestock sector in 2015, and exceeds the target of 163 million tons of CO<sub>2</sub> equivalent initially established for the ABC Plan in the National Policy on Climate Change. In summary, sustainable technologies now cover at least 48 million ha in Brazil – twice the size of the United Kingdom.

The adoption of ABC agriculture was partly achieved thanks to public efforts to foster the ABC Plan and the investments made under the ABC Programme, which financed different practices and techniques in a total of 6.58 million ha (Manzatto et al., 2020). However, more than 34 million ha and a considerable part of the waste treatment were funded by other sources, proving that ABC agriculture practices and techniques are of great interest

to farmers and other participants in the agribusiness chains.

Despite significant advances, there remain extensive areas of degraded pasture in Brazil, estimated at more than 45 million ha, out of a total pasture area of around 170 million ha. The production of single crops in monoculture is common practice in properties of all sizes in all regions of Brazil, while the correct management of waste and the use of its by-products still has to expand.

Considering that some ABC techniques, such as integrated systems, are relatively new and have been in use for a short period, it is only natural that their adoption is still not as widespread as it is expected to become. Techniques that have been around for longer, in turn, are already widespread. This is the case, for example, of the no-till farming system, which slowly began to be adopted in the 1970s and is now used on a large scale in grain production.

Public policies such as the ABC Plan, the ABC Programme, and now the ABC+ Plan, as well as initiatives by private institutions, research institutions and the third sector, contribute to shortening the period between the emergence of a particular technology and its large-scale adoption, whether by informing entities and companies about ABC agriculture and the policies that foster it, or by identifying obstacles and proposing solutions to public authorities and society in order to overcome the challenges and expand ABC agriculture.

“The link between the socioeconomic advantages and the positive environmental effects of ABC agriculture has become increasingly evident to society.”

In this sense, considering that the expansion of ABC Agriculture estimated by Manzatto et al. (2020) has occurred in less than 20% of the country's total agriculture and livestock farming area, it is possible to assert that these practices have an enormous potential to further align Brazilian agribusiness with the need for sustainable development models in food production, which are vital in the current context.

An important advance that should contribute to greater adoption of ABC agriculture in Brazil will be the establishment of a system to monitor and evaluate the impact of ABC agriculture, especially when it comes to the mitigation of greenhouse gas emissions. The implementation of a monitoring, reporting and verification (MRV) system is provided for in the ABC+ strategic plan, and the tools and information flow to be included in this system have already been designed (Perosa et al., 2020). This system has been devised in line with the recommendations of international standards

and based on scientific knowledge on tropical agriculture developed and published by Brazilian institutions. Once implemented, the MRV system will allow Brazil to measure the contribution of ABC agriculture to addressing climate change and to the national inventory of greenhouse gases. It will also create several opportunities for private funding and sponsoring of ABC agricultural practices, including payment for environmental services and green bonds.

These unambiguous benefits explain why more and more public and private entities, companies, NGOs, and sectoral and financial institutions are interested and involved in the expansion of ABC agriculture in Brazil. The link between the socioeconomic advantages and the positive environmental effects of ABC agriculture has become increasingly evident to society.

Low-carbon agriculture is expected to become the predominant production paradigm in the future of Brazil and other countries, due to the economic, social and environmental benefits it can provide. Going further in this vision of the future of Brazilian agriculture and livestock farming, we must consider that, once it is well established on a large scale in the country and monitored with technologies and tools to measure, record and verify its environmental benefits, it will open up a set of previously unimaginable opportunities.

To conclude, I would like to offer a simple example of this potential: imagine that, when buying a package of grains or a cut of meat in the supermarket, consumers could read on the package, in addition to the nutritional details, information such as: “amount of carbon sequestered” and “volume of water saved in the springs”, related to the production of that particular food item. This information would enable consumers to choose nutritious and environmentally healthy food, aligned with the capacity of ABC agriculture rural producers to contribute to the planet’s sustainability. And considering Brazil’s significant role in food production, ABC agriculture will allow the country to consolidate its role as the world’s “Agri-Environmental Powerhouse”.

## References

**BRAZIL. Ministry of Agriculture, Livestock and Supply. Plano setorial de mitigação e de adaptação às mudanças climáticas para a consolidação de uma economia de baixa emissão de carbono na agricultura: plano ABC (Agricultura de Baixa Emissão de Carbono) [Sectoral plan for mitigation and adaptation to climate change to consolidate a low-carbon economy in agriculture: ABC plan (Low-Carbon Agriculture)]. Ministry of Agriculture, Livestock and Supply, Ministry of Agrarian Development, Office of the President's Chief of Staff. Brasília: MAPA/ACS, 2012. 173 p.**

**Manzatto, C. V., Araújo, L. S., Assad, E. D., Sampaio, F. G., Sotta, E. D., Vicente, L. E., Pereira, S. E. M., Loebmann, D. G. S. W., Vicente, A. K. Mitigação das emissões de Gases de Efeitos Estufa pela adoção das tecnologias do Plano ABC: estimativas parciais (Mitigating greenhouse gas emissions by adopting ABC Plan technologies: partial estimates). Documentos 122, Embrapa Meio Ambiente, June 2020, 35 p.**

**Perosa, B. B., Manzatto, C. V., Vicente, L. E., Vicente, A. K., Araujo, L. S., Assad, E. D., Gurgel, A. Emissões de gases do efeito estufa pela agricultura de baixa emissão de carbono (Greenhouse gas emissions from low-carbon agriculture). Agroanalysis (FGV), v.40, p.29 - 31, 2020.**

## About the author

**Mr. Gurgel is an agricultural engineer and holds a PhD in Applied Economics from the Federal University of Viçosa, with post-doctoral studies at the Massachusetts Institute of Technology (MIT). He is a Research Scientist at the MIT Joint Program on the Science and Policy of Global Change. He was coordinator of the professional master's degree in agribusiness and coordinator of the Low-Carbon Agriculture Observatory at the São Paulo School of Economics of the Getulio Vargas Foundation (FGV/EESP). He was also a professor at the School of Economics, Business and Accounting of the University of São Paulo (USP/FEARP).**

**+44 020 7747 4500**

**agriculture.london@itamaraty.gov.br**

**londres.itamaraty.gov.br**

**14-16 Cockspur St, St. James's, London SW1Y 5BL**

