

Subsidies and Environmental Sustainability of Brazilian Agriculture – some drivers, indicators and results

Trade and Environmental Sustainability Structured Discussions (TESSD)

16-17/3/2023

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AGRICULTURA
E PECUÁRIA

GOVERNO FEDERAL
BRASIL
UNIÃO E RECONSTRUÇÃO

A MULTI-BILLION-DOLLAR OPPORTUNITY

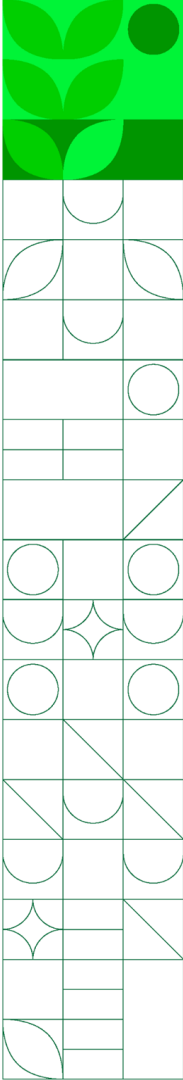
Repurposing agricultural support to transform food systems



Why repurposing?

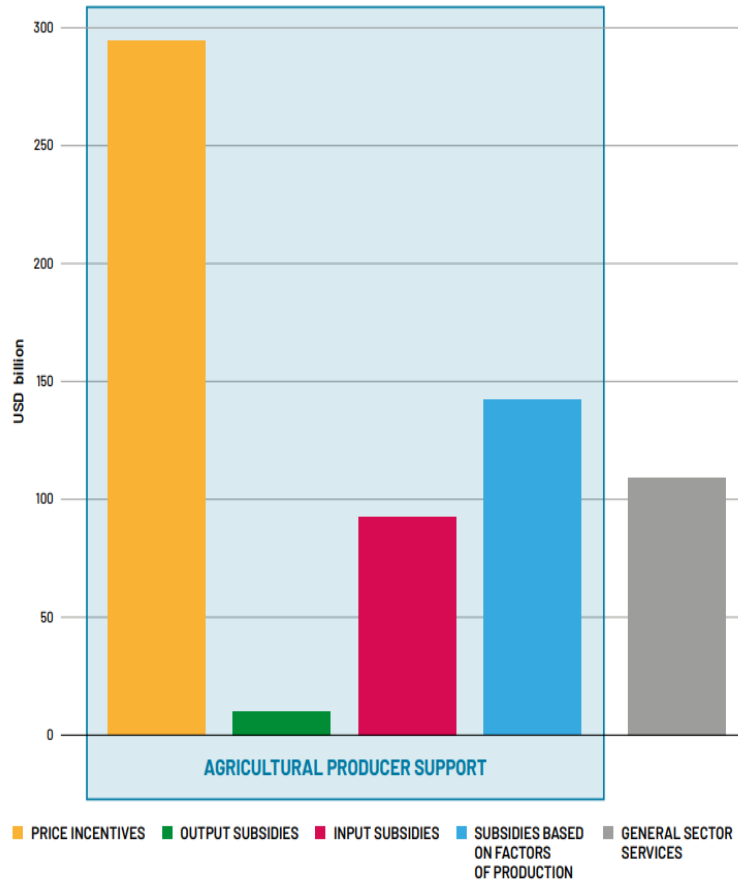
Most resources go to emission-intensive (beef, milk and rice), and **unhealthy crops** (sugar);

Policies are mainly implemented by middle and high income countries (around 25% of the production value in the European Union and more than 40% in Japan, for example), **while in low-income countries this support is “negative”**.



► FIGURE 4

Level and breakdown of global agricultural sector support (average 2013-2018)



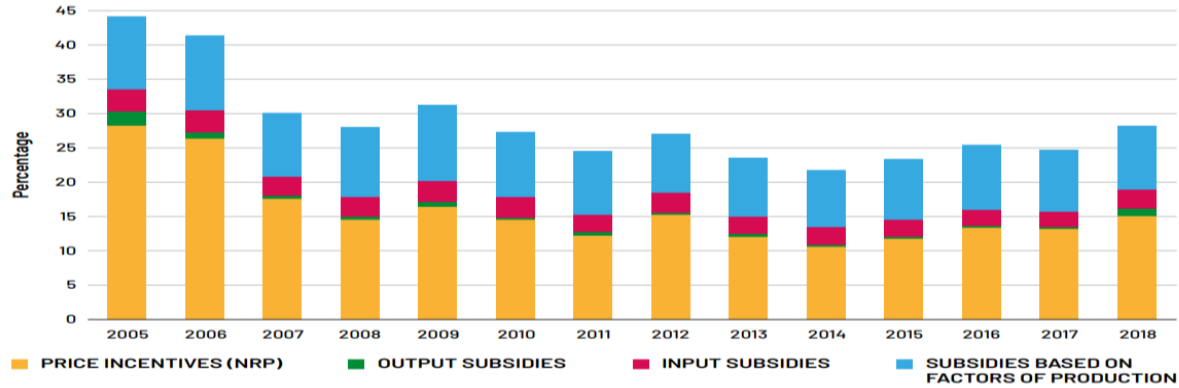
Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

Global estimates:

- **73% of the support (USD 540 billion) are in the form of price incentives and fiscal subsidies;**
- **More than a half of this amount (USD 294 billion) is provided through price incentive policies and market interventions (tariffs, duties, quotas, and fixed or floor prices);**
- **Other USD 245 billion are provided through fiscal subsidies;**
- **Thus, most of the resources spent on support instruments interfere with production decisions and distort trade.**

▶ **FIGURE 7**

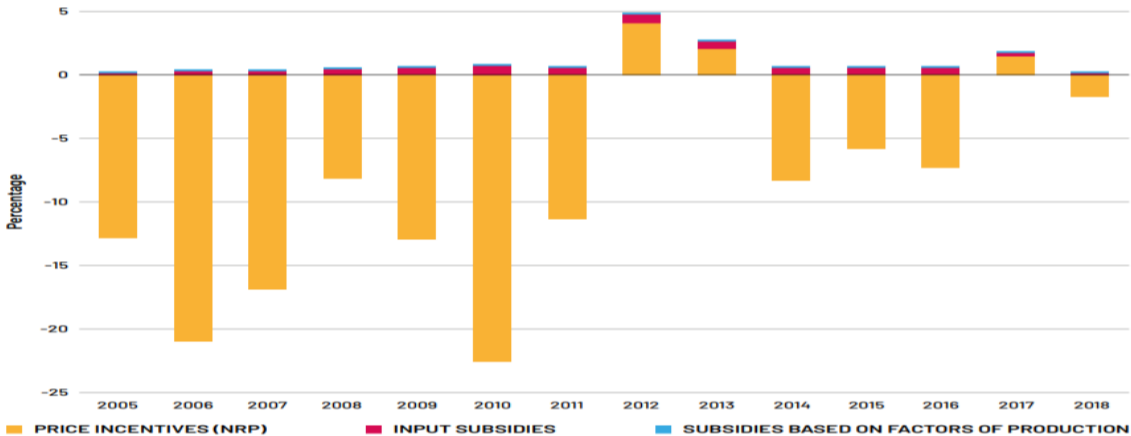
Nominal rate of assistance for high-income countries as a percentage of production value, by type of support



Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

▶ **FIGURE 13**

Nominal rate of assistance for low-income countries as a percentage of production value, by type of support



Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

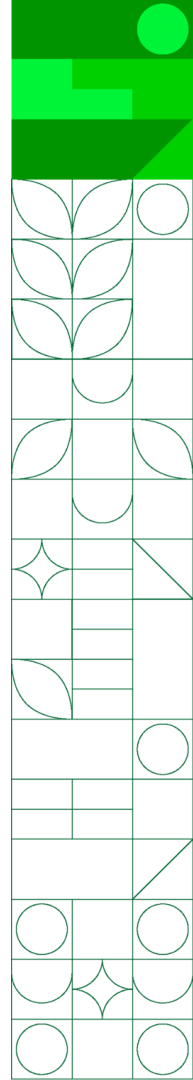
Why not phase them out?

- Subsidies from high-income countries drive prices down below production costs in low-income countries.
- Thus, imports become more attractive than domestic production.
- “Negative” agricultural subsidies in the poorest countries “feed” the vicious circle of poverty.

How does Brazil fit into this context?

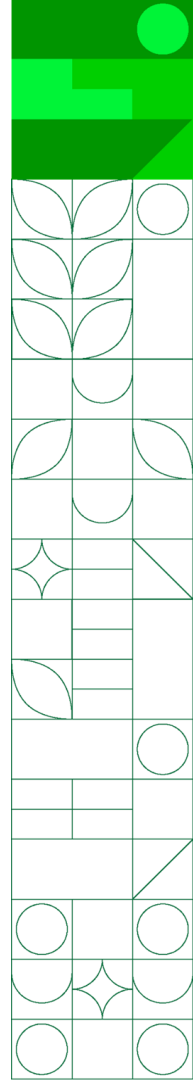
Highlights:

- Agricultural policies...
- Agricultural indicators...
- Challenges to strengthen sustainability



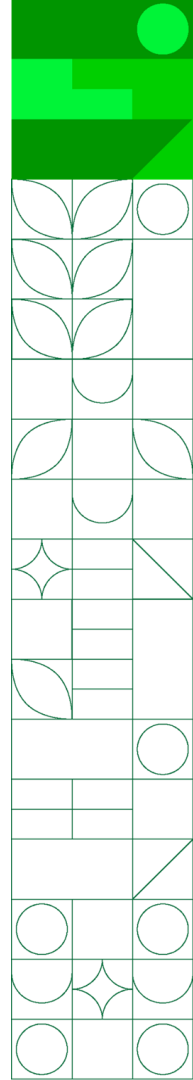
Main goals of the Brazilian Agricultural Policy:

- i) Increase productivity;**
- ii) Reduction of greenhouse gas emissions;**
- iii) Prevention of losses in agricultural production;**
- iv) Rationalization of the use of natural resources and inputs;**
- v) Soil recovery and conservation;**
- vi) Improving the quality and health of agricultural production;**
- vii) Treatment of manure and agricultural residues; and**
- viii) Reforestation**



Environmental sustainability has guided agricultural policy for decades...

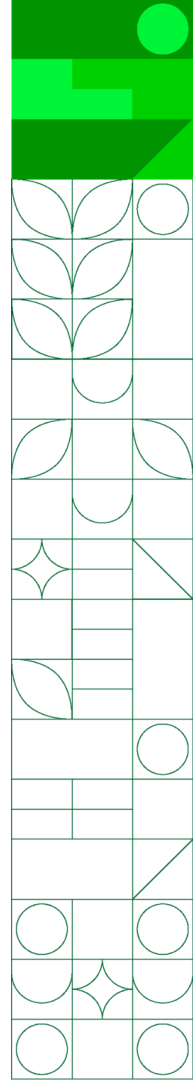
- i) **National Alcohol Program (Proálcool) - 1970s;**
- ii) **Agricultural Climate Risk Zoning – has been improved since the 1980s;**
- iii) National Program for Strengthening Family Farming (Pronaf) - 1995;
- iv) Incentive Program for the Use of Soil Amendments (Prosolo) - 1998/1999 Crop Season;
- v) Incentive Program for Mechanization, Cooling and Bulk Transport of Milk Production (Proleite) - 1999/2000 Crop Season;
- vi) Program to Modernize the Fleet of Agricultural Tractors and Associated Implements and Harvesters (Moderfleet) - 1999/2000 Crop Season
- vii) National Program for the Recovery of Degraded Pastures (Propasto) - 2000/2001 Crop Season;
- viii) Incentive Program for Construction and Modernization of Storage Units on the Farms (Proazem) - 2001/2002 Crop Season; and,
- ix) **Low carbon Emissions Agriculture Plan – ABC Plan (2009).**



About the Brazilian Forest Code

(Federal Law n° 12,651/2012)

- This Law establishes minimum limits for environmental preservation in rural properties.
- All farms (more than 6.6 million) must be registered in the Rural Environmental Registry (CAR).
- The registries are being analyzed and if a farm has any environmental irregularity, its owner must adhere to the Environmental Regularization Program.
- The investments necessary for regularization (such as the recovery of legal reserve and permanent preservation areas) can be financed under the Official Rural Credit.
- There are also private investors interested in leveraging the ecosystem benefits arising from this environmental regularization process.



Some agricultural indicators...

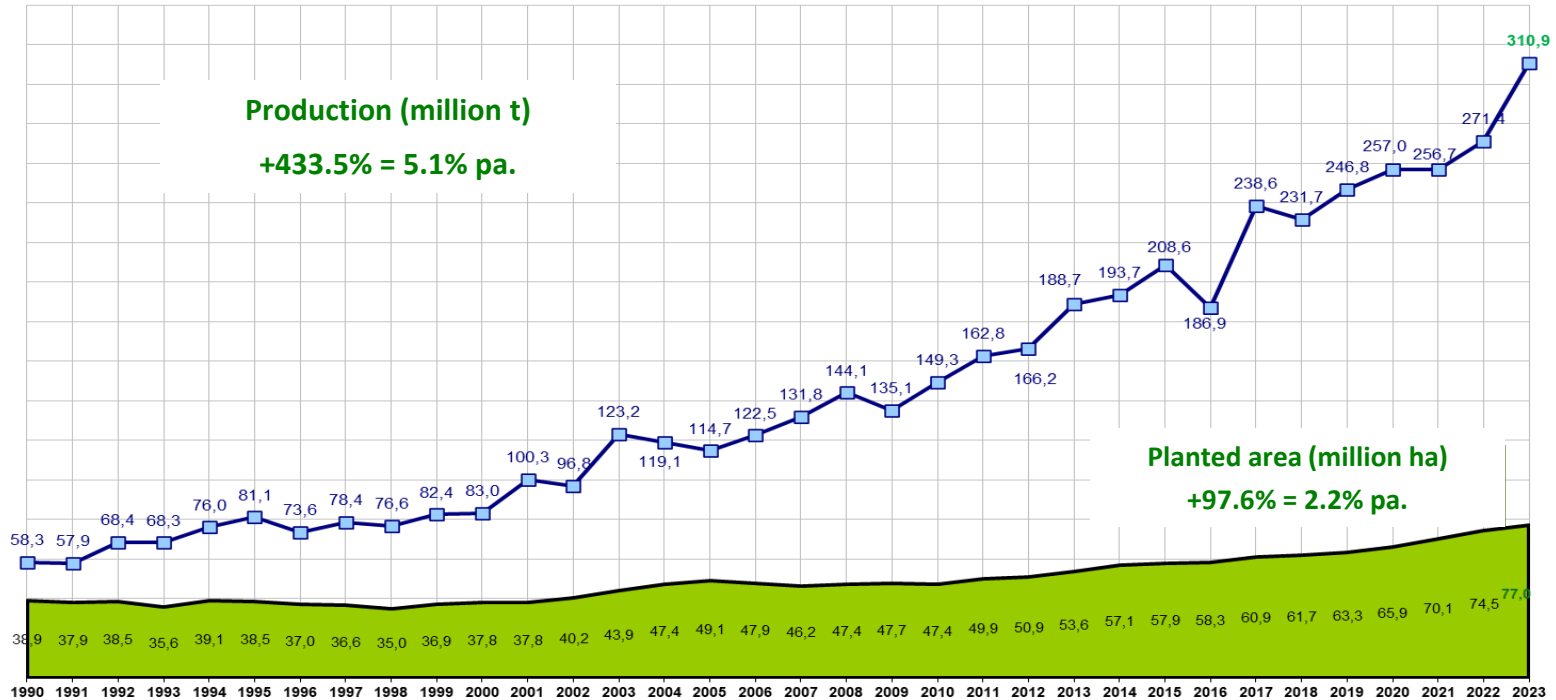
Occupation of Brazilian territory (changes from 1985 to 2021)

Type of coverage		1985	2021	ΔS
Total area of the country		850,65	850,65	0,00%
Forests (primary vegetation)	Area	586,39	508,64	-13,26%
	% of territory	68,93%	59,79%	
Farming	Area	180,33	265,01	46,96%
	% of territory	21,20%	31,15%	
Other uses (*)	Area	83,94	77,00	-8,27%
	% of territory	9,87%	9,05%	

Source: MAPBIOMAS (<https://mapbiomas.org/estatísticas>)

(*) It includes, in addition to cities and road infrastructure, lakes, swamps, rocks, mangroves and other non-anthropogenic areas.

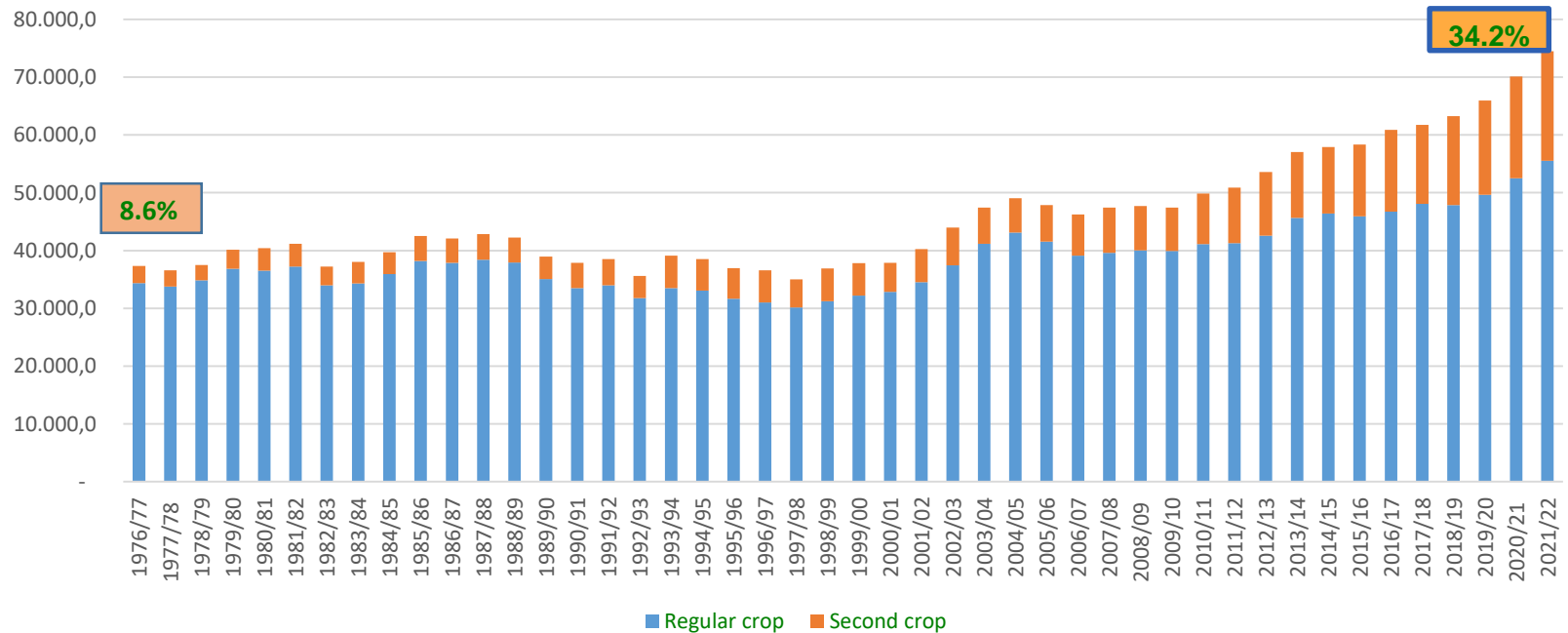
Evolution of planted area and grain production in Brazil - 1990 to 2023



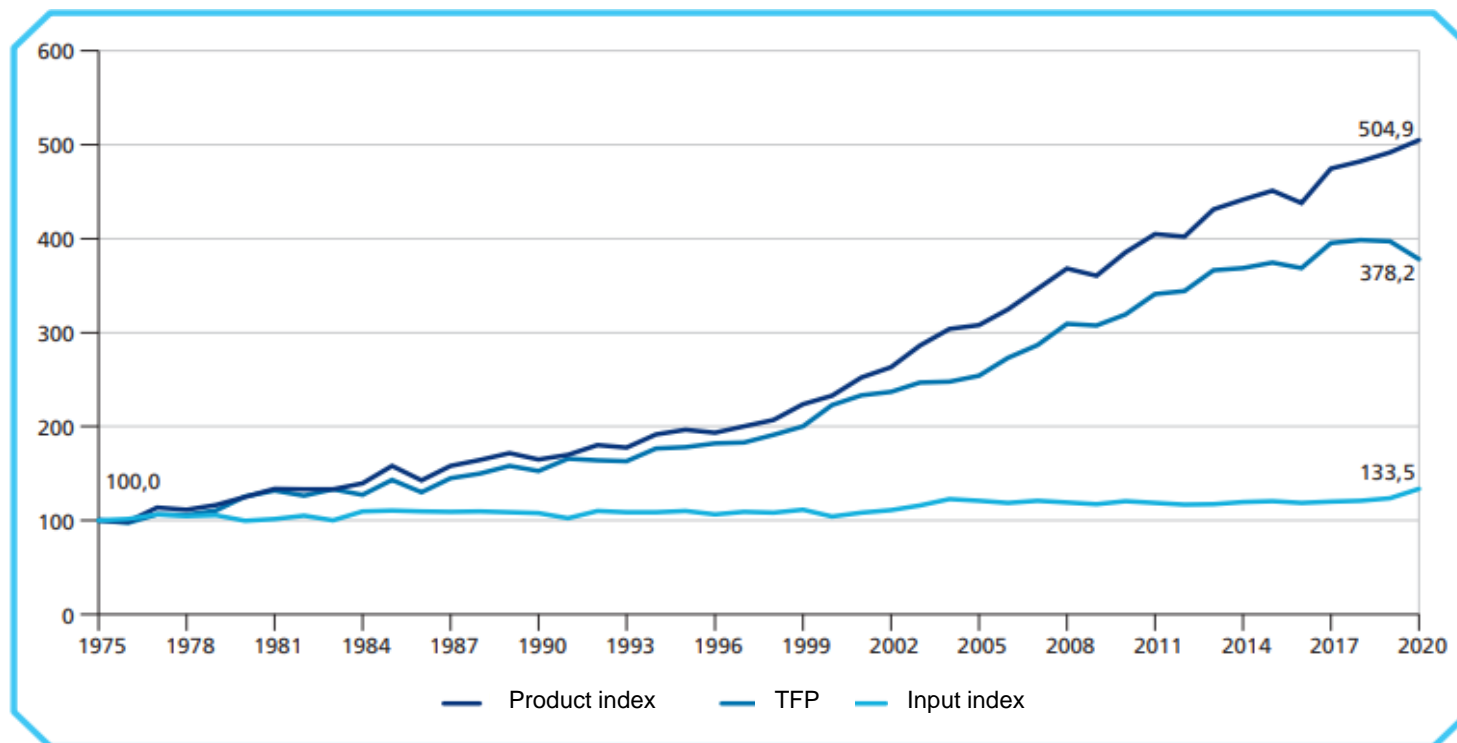
Fonte: CONAB e LSPA/IBGE. Elaboração: SPA/Mapa. Posição: **janeiro 2023**. *Refere-se a algodão, amendoim, arroz, aveia, canola, centeio, cevada, feijão, girassol, mamona, milho, soja, sorgo, trigo, triticale. **estimativa.

The growing importance of double cropping...

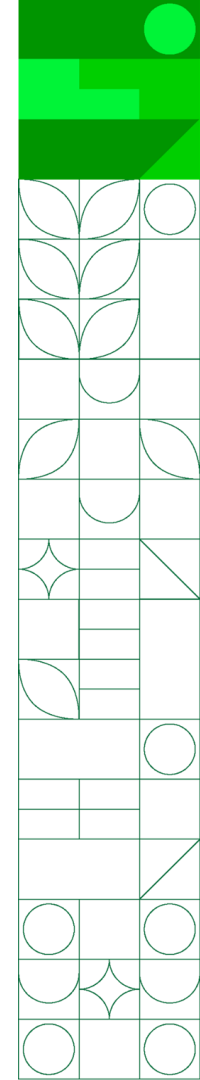
Evolution of the area planted with grains in Brazil, from 1976/77 to 2021/22 (area in ha X 1,000)



Evolution of Total Factor Productivity (TFP) in Brazilian Agriculture (1975 to 2020)



Source: Gasques, J. G.; Bastos, E. T.; Bacchi, M. R. P.; Vieira Filho, J. E. R. Texto para Discussão 2764. Instituto de Pesquisa Econômica Aplicada - IPEA. Brasília, 2022.

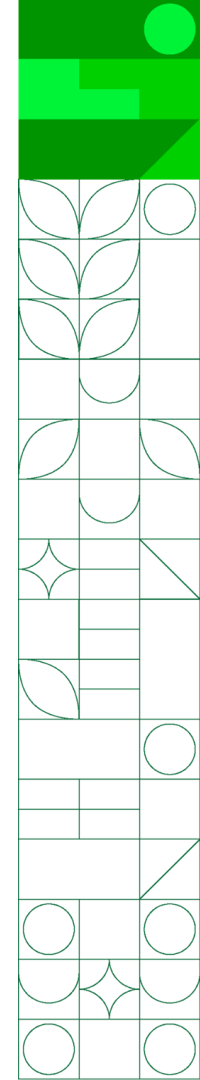


Evolution of Brazilian agriculture from 1990 to 2020 (some indicators)

Category		1990	2020	ΔS	% of the territory	
					1990	2020
Grains	Occupied area	35,08	49,62	41,45%	4,12%	5,83%
	Planted area	38,95	65,92	69,24%	4,58%	7,75%
	Production	58,28	257,02	341,01%		
Sugar Cane	Planted area	4,29	10,04	134,03%	0,50%	1,18%
	Production	222,90	642,72	188,34%		
Livestock (Cattle)	Pastures area	195,90	151,62	-22,60%	23,03%	17,82%
	Beef	4,63	10,10	118,14%		
	Milk	14,48	35,4	144,48%		
Pig meat		1,04	4,13	296,63%		
Chicken meat		2,27	13,88	511,45%		
GHG Emissions (Agricultural Sector)		329,61	477,67	44,92%		
Brazilian population (million)		150,70	213,20	41,47%		

Sources: Conab, Ministry of Agriculture; IBGE; MCT&I and Others.

(*) Area in million of hectares. Production in million of metric tons, except milk (billion liters).



Low Carbon Agriculture Plan (Plano ABC) - goals and results (2010-2020)

Technology	Area (Mha)			Mitigation (M t CO ₂ eq)		
	Goal	Result	Achievement	Goal	Result	Achievement
Recovery of degraded pastures	15	26.8	179%	104	36,01	35%
Crop-Livestock-Forest Integration	4	10.76	269%	18 to 22	40.78	185%
Direct Planting System	8	14.59	182%	16 to 20	26.7	133%
Biological nitrogen fixation	5.5	11.78	214%	10	21.56	216%
Planted forests	3	1.88	63%	-	8.82	-
Treatment of animal waste	4,4 million m ³	38.34 million m ³	871%	6.9	59.81	867%
Total	35.5 million ha	54.03 million ha	152%	133 to 163	193.67 M t CO₂ eq	119%

Source: Ministry of Agriculture and Livestock.

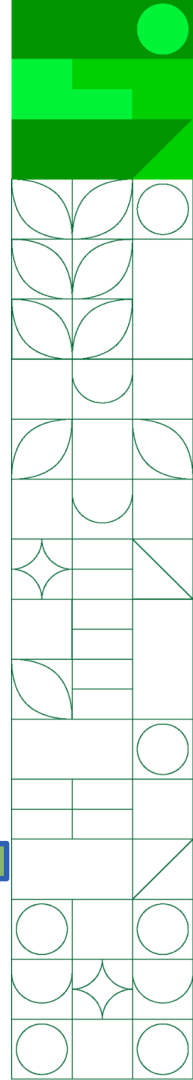
ABC Program: just one of the options for accessing resources...

Environmentally sustainable financing (number of contracts and amounts)

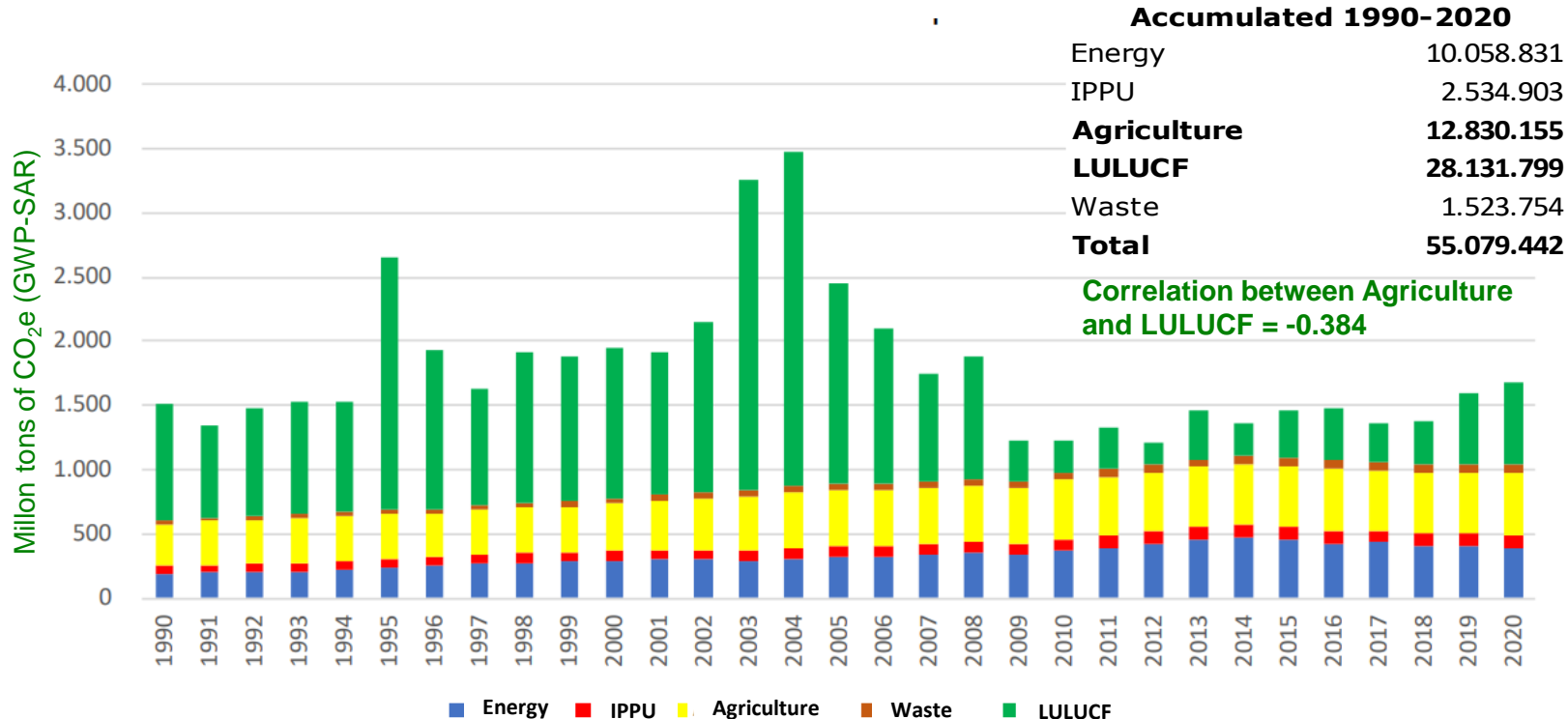
Categories	2019/20		2020/21		2021/22	
Investment	Qty	US\$ (million)	Qty	US\$ (million)	Qty	US\$ (million)
Lines of support for Low Carbon Emission Agriculture	39.649	616,72	32.841	497,52	35.574	761,90
Lines of support Sustainable Practices	27.745	2.294,93	24.826	2.006,45	21.513	2.148,97
Other Environmentally Sustainable Contracts	222.060	4.085,67	255.156	6.203,37	207.833	7.037,19
Subtotal	289.454	6.997,32	312.823	8.707,34	264.920	9.948,05
Costing	Qty	US\$ (million)	Qty	US\$ (million)	Qty	US\$ (million)
Other Environmentally Sustainable Contracts	341.540	10.223,97	370.672	10.383,81	374.150	12.048,11
Subtotal	341.540	10.223,97	370.672	10.383,81	374.150	12.048,11
Total	630.994	17.221,29	683.495	19.091,15	639.070	21.996,16



Source: Central Bank of Brazil (extracted from the Rural Credit Data Matrix-Credit Granted until 09/09/2022) Prepared by: MAPA/SPA/DEFIN. It considers the following average exchange rates: 2019 (US\$1.00/R\$3.9451), 2020 (US\$1.00/R\$5.1558), and 2021 (US\$1.00/R\$5.395).



Brazil. Annual sectoral GHG emissions from 1990 to 2020.

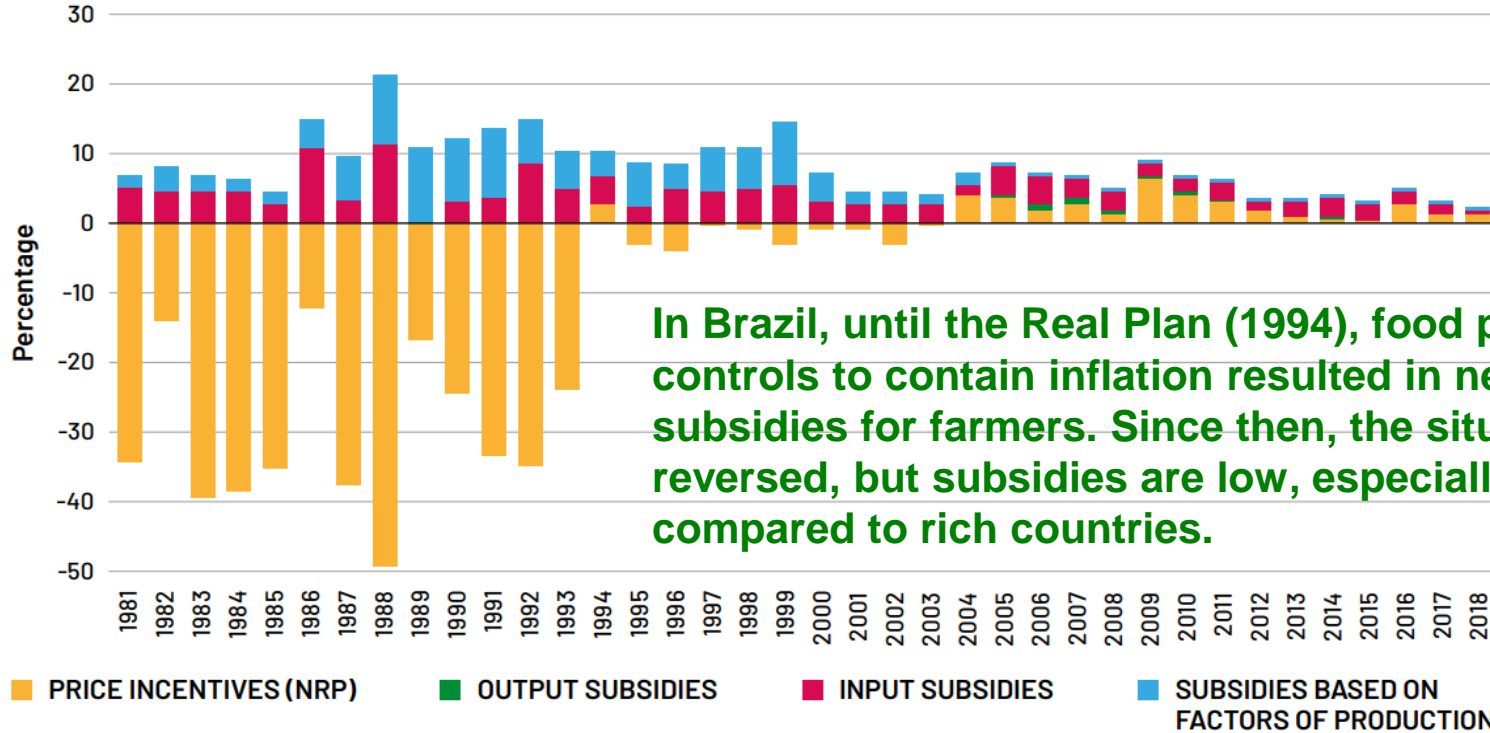


Brazil's sectoral emissions, in CO₂e, from 1990 to 2020.

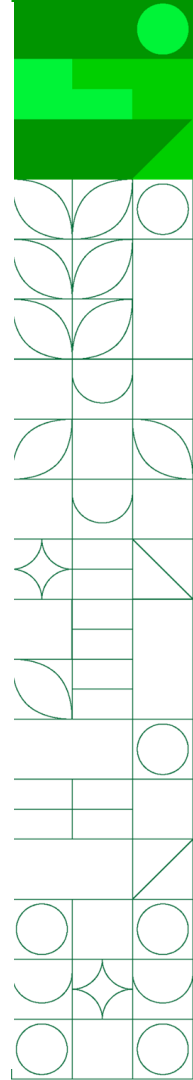
Source: Annual estimates of greenhouse gas emissions in Brazil. 6th Edition. 2022. Ministry of Science, Technology and Innovation.

▶ **FIGURE 28**

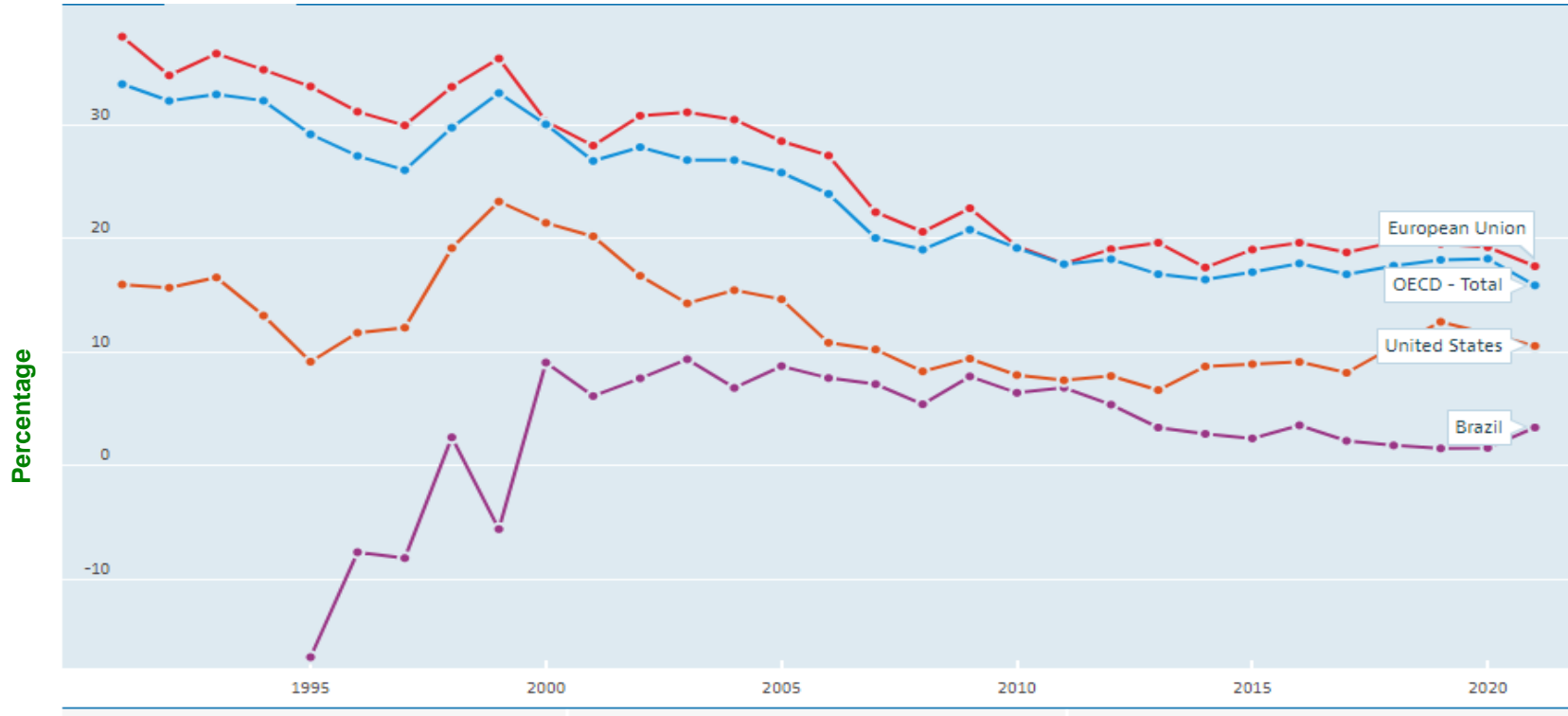
Nominal rate of assistance as a percentage of country production value in Brazil, 1981–2018



Source: Laborde and Mamun, forthcoming.



Producer Support Estimate (PSE) – evolution

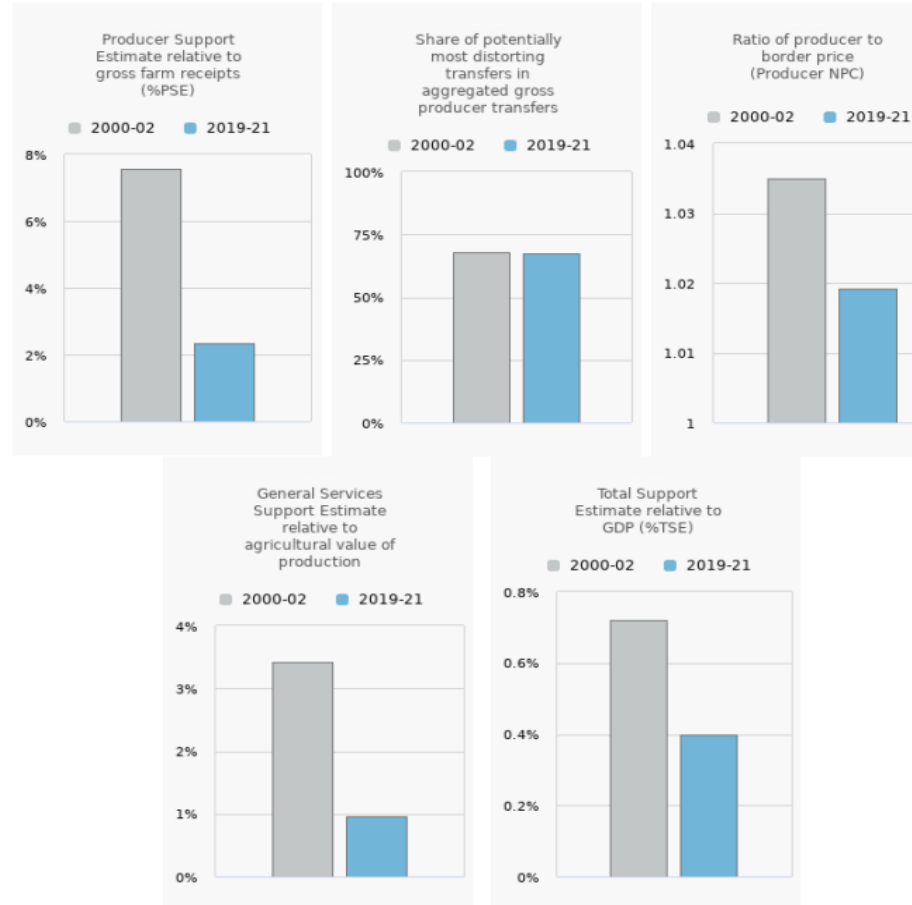


Source: OECD (<https://data.oecd.org/agrpolicy/agricultural-support.htm>).

Figure 6.1. Brazil: Development of support to agriculture

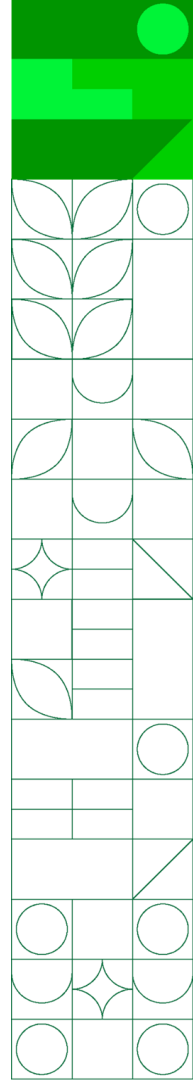
Additional remarks:

- Credit subsidies (Official Credit sources) are the main input subsidy instrument;
- In this crop season, less than a third of the resources raised by farmers will come from Official Credit sources;
- Credit subsidies represent less than 1% of the value of agricultural production in this crop season;
- 70% of the Federal Government budget for subsidies is allocated to credit operations for family farming;
- Environmental sustainability is an essential requirement for accessing resources, whether from Official Credit (resources controlled by the government, with specific rules) or from the private market (without the need to follow such rules).



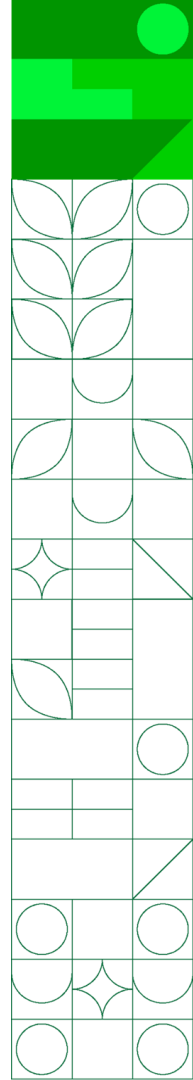
Final thoughts on Brazil...

- **Production has grown at an accelerated pace, contrasting with the reduction of subsidies, which demonstrates the economic sustainability of Brazilian agriculture;**
- **Instruments such as ecological-economic zoning and agricultural climate risk zoning are fundamental for increasing environmental sustainability: they indicate more suitable areas (and those areas where it is most appropriate to invest in the regeneration of the ecosystem), lowering the negative environmental impacts;**
- **As a result, there is a need to associate financing for sustainable production with financing for the recovery/restoration of ecosystems, especially in areas with less aptitude for the agriculture;**
- **Payment for environmental services should be an important instrument in this reconversion process.**



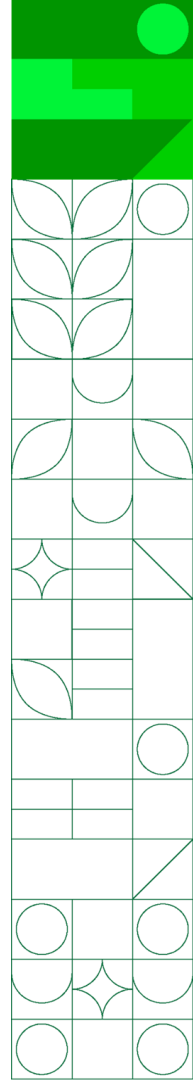
PES: between fair price and subsidies...

- **Main drivers: cost of conservation of preserved areas (and restoration of ecosystems in areas with low suitability for agriculture and livestock); opportunity cost of using these areas for production; and value of ecosystem services;**
- **"Profitability of conventionally undertaken activities" as a proxy for "opportunity cost". Thus, PES may be lower, but it needs to fund the investments necessary for the restoration of ecosystems;**
- **PES should be, at most, equal to the ecosystem benefits generated;**
- **Pricing water resources and carbon stocks is easier than pricing biodiversity (price based on the number of fauna and flora species and the value of each species, for example).**



Concluding...

- **Sustainability requires a balanced approach between economic, social and environmental aspects.** If it is necessary to adopt subsidies to keep the economic aspects artificially viable, then the activity should not be considered sustainable;
- **Agricultural subsidies that distort trade and production tend to be the most harmful to the environment.** They are used by countries with less agricultural aptitude, which need to make major interventions in the environment to achieve some productivity. This is the case in countries that have very cold winters, requiring the installation of heating structures for the comfort of the animals. On the other hand, countries with comparative advantage and resource abundance can be more competitive and efficient in agricultural production; and,
- **The Brazilian experience demonstrates that policies to support agriculture can contribute to increasing efficiency and sustainability of production, reducing the need for subsidies in the long term.**



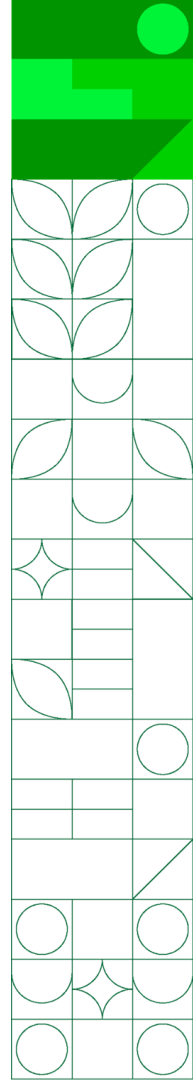
Thank you!

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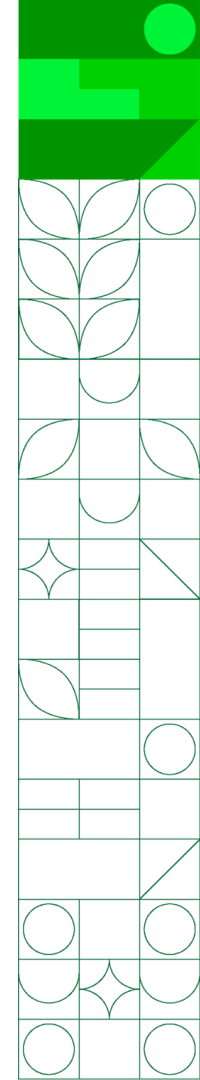
Additional information...



Agricultural Climate Risk Zoning - basic information

Goal	Identify the "windows of opportunity" for planting each crop, throughout the year, throughout the agricultural area of the national territory.
Covered area	The entire agricultural area of the country, but with a focus on the main crops in each region.
Crops covered	More than 40 crops, including major ones, such as corn, soybeans, rice, beans, coffee, cassava and wheat.
Methodology	Estimation of the risk of losses, comparing the requirements of each crop with pedological data and historical series of climatic behavior in each municipality in the country.
Functionality	Guides the decisions of farmers (what, when and where to plant and which variety to use), financial agents (what to finance) and insurers (calculation of premium based on risks).

Source: Embrapa. Elaborated by the author.



Low Carbon Agriculture Plan (Plano ABC+) - goals for 2021-2030

Technology		Goal in Area million ha	Goal of Mitigation M t CO ₂ eq
Recovery of degraded pastures		30.0	113.7
Direct Planting System	Grains	12.5	12.1
	Vegetables	0.08	0.88
Integration Systems	Crop-Livestock-Forest Integration	10.0	4.1
	Agroforestry Systems	0.1	37.9
Planted Forests		4.0	510.0
Bioinputs		13.0	23.4
irrigated Systems		3.0	50.0
Animal Production Waste Management		208.4	277.8
Livestock - Intensive Finishing		5	16.24
Total ABC+	72.68 million ha + 208.40 million m³ + 5 million animals		1,076.24 million t CO₂ eq

Source: Ministry of Agriculture and Livestock.

Sugar cane as a source of renewable energy:

- **Planted area grew by 7.64 million hectares between 1977 and 2022;**
- **However, between 2000 and 2022, the consumption of fuel ethanol prevented the emissions of nearly 700 million tons CO₂e;**
- **Over these last 23 years, Brazil consumed 466 billion liters of fuel ethanol, which represented 45.8% of Otto cycle fuel consumption;**
- **Sugarcane bagasse is another important source of energy, both thermal (internal processes at the mills) and electrical (cogeneration and sale of surpluses to the grid);**
- **Sugarcane accounted for 19.2% of the domestic energy supply in 2020;**
- **Adding to charcoal and firewood, biodiesel and lye, biomass represented more than 30% of primary energy sources in 2020.**

