“The Future of Agriculture and Role of Research and Innovation”

Ladislau Martin-Neto
R&D Executive Director
Embrapa
Brazil

Japanese Chamber of Commerce and Industry of Brazil
Japanese Embassy in Brazil
São Paulo June 23, 2017

Embrapa

Ministério da
Agricultura, Pecuária
E Abastecimento

BRASIL
GOVERNO FEDERAL

OUTLINE

- Ten major challenges for mankind
- Agricultural Revolution in Brazil
- Scenarios that must affect agriculture production systems
- Brazilian Agricultural Research System and Embrapa- highlights
- Recent results and new opportunities to innovation and investments
- Final Considerations

Ten major challenges for mankind in the coming 50 years

2003: 6.3 (7) billion people

2050: 10 (9) billion people

Energy

Water

Food

Environment

Poverty

(**Nobel Prize winner, Alan MacDiarmid at Embrapa- São Carlos. SP. - April 2005**)

Education

Democracy

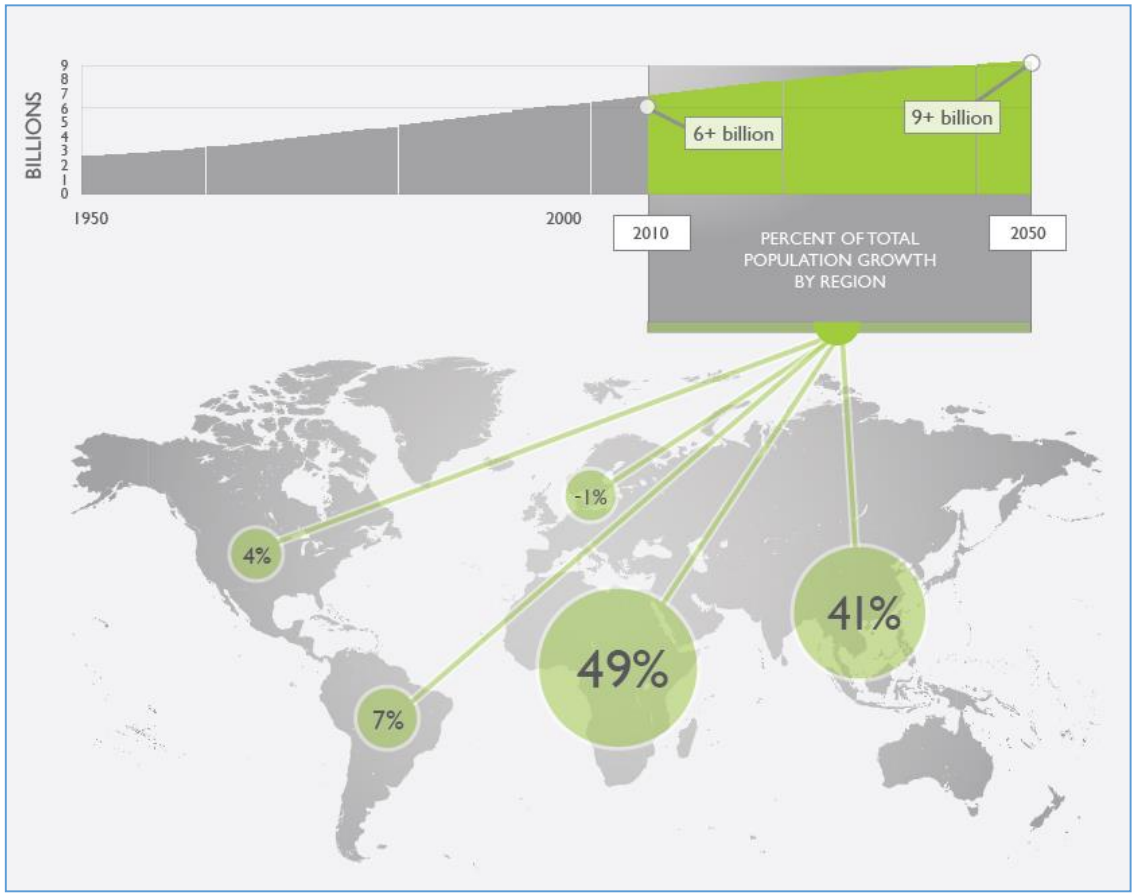
Population

Diseases

Terrorism & War

Expected Populational Growth by Region

2010 - 2050



Source: UN data from Global Harvest Initiative GAP Report (2011).

Expected Populational Growth by Region

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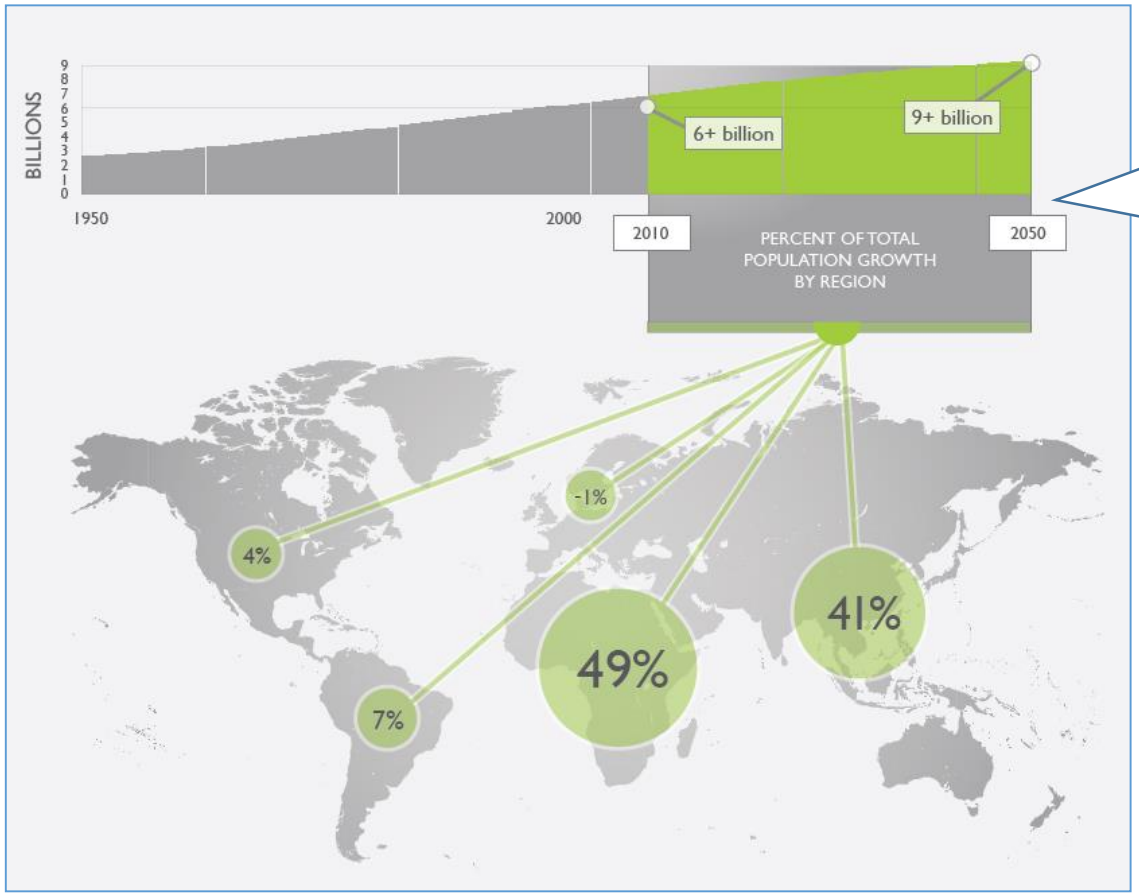
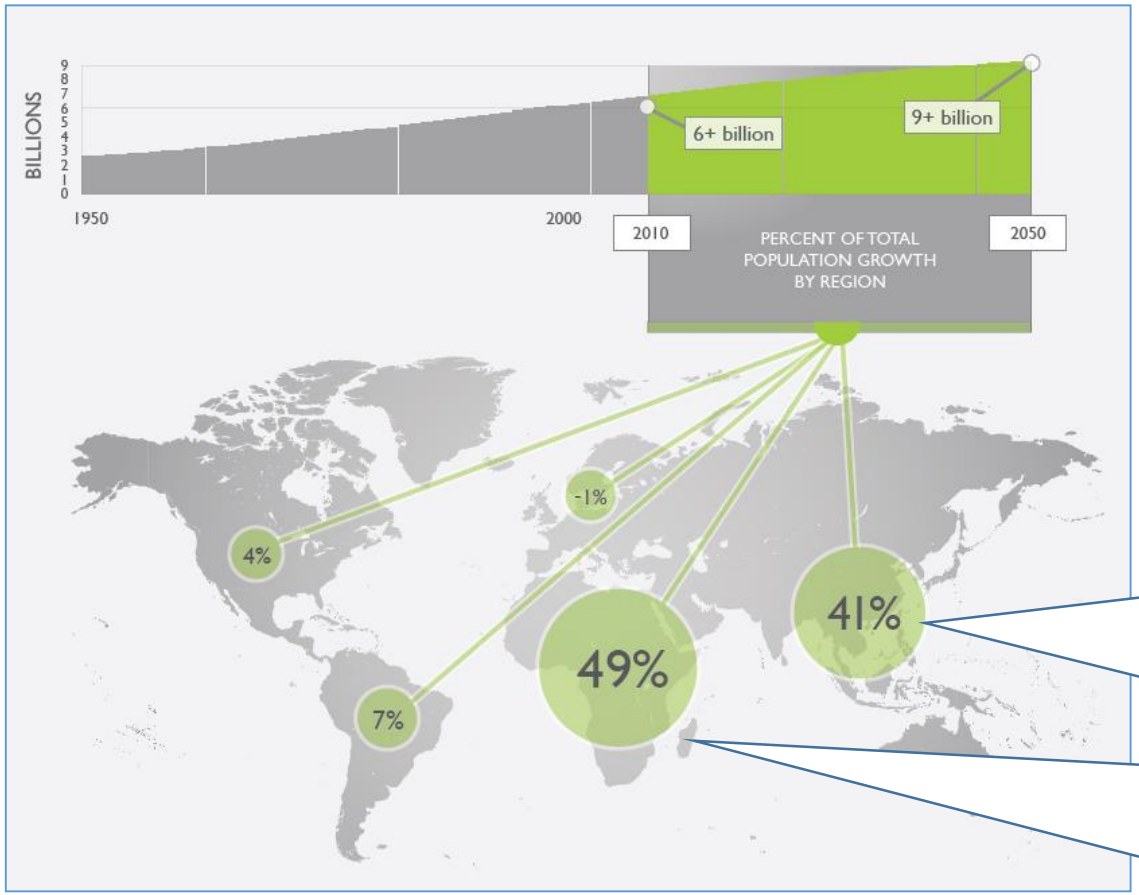


From 2010 to 2050, population must growth more than 30% with more 2.3 billion of people to feed.

Source: UN data from Global Harvest Initiative GAP Report (2011).

Expected Populational Growth by Region

2010 - 2050



from Global Harvest Initiative GAP Report (2011).

Largest part of populational growth is expect in Sub-Saharan Africa and Asia with limitations to increase food production.

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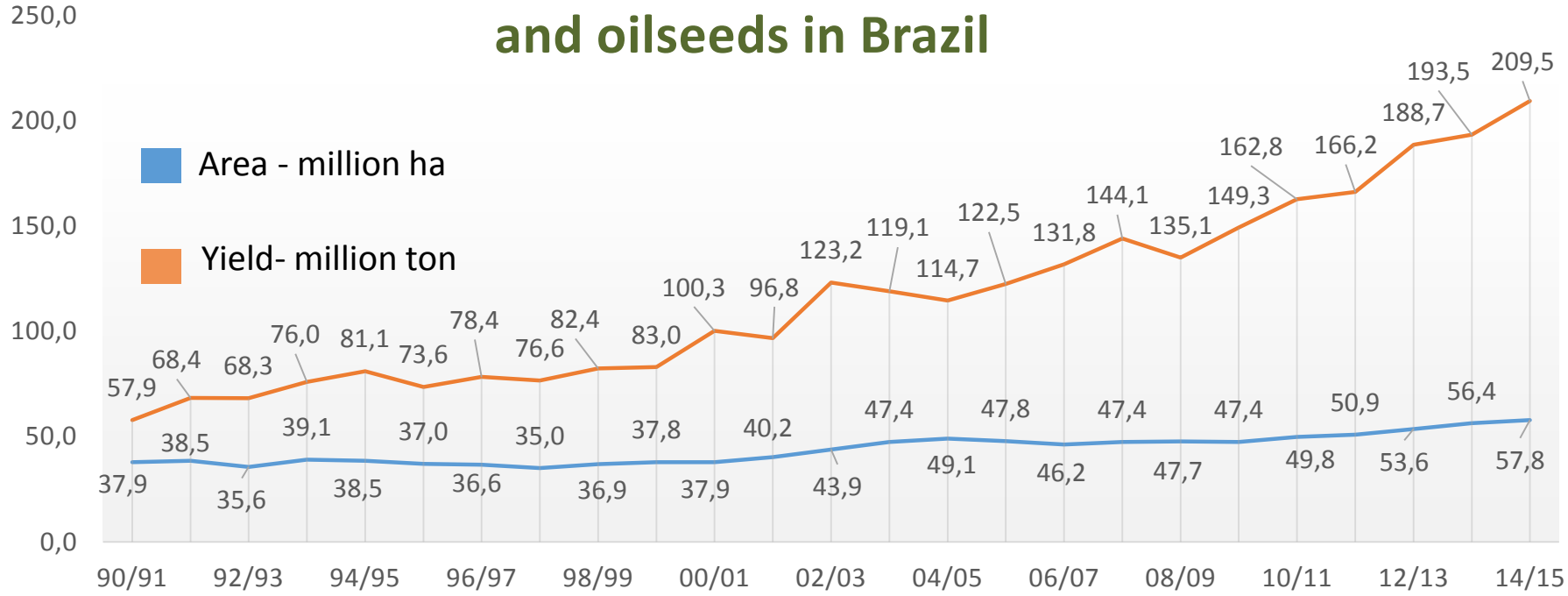
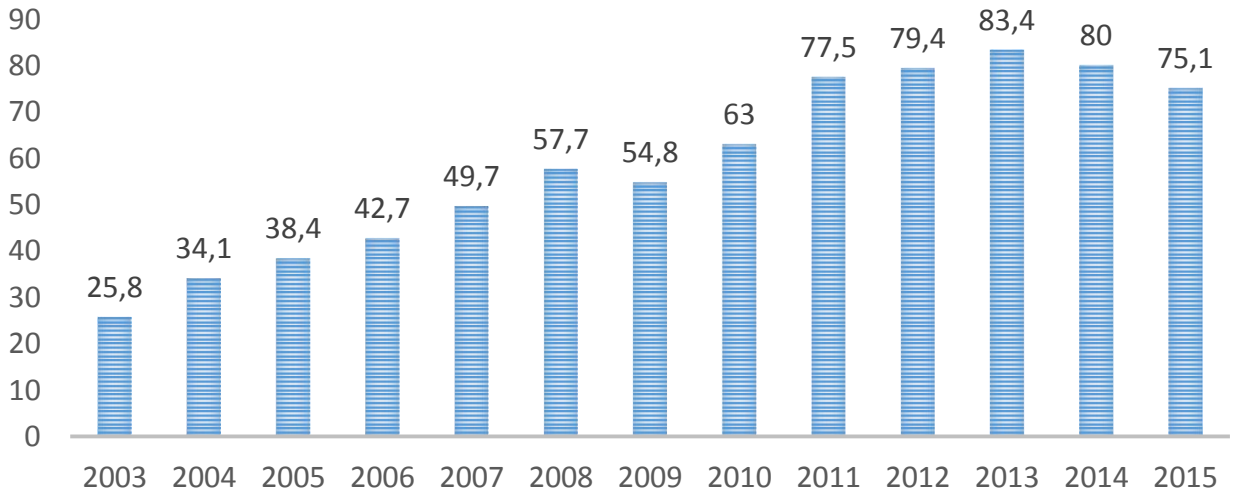
Brazil – Agriculture Production

Evolution of production- Area and Yield of grains and oilseeds in Brazil



Agribusiness surplus of trade balance (billion of dollars)



BRAZILIAN FOOD SECURITY

Sufficient food production to 200 million of inhabitants and exportation of around 300 products to 180 countries (currently 20% of production is exported)

Production

Brazil is a major producer of grains, meat and fruits, and the agricultural sector accounts for **22.5% of GDP , 37% of the labor force and 40% of exportation (2º largest food exporter)**

188,10 (* 230)
MILLIONS OF TONS
(2015/16) (* 2016/17 estimate)
GRAINS

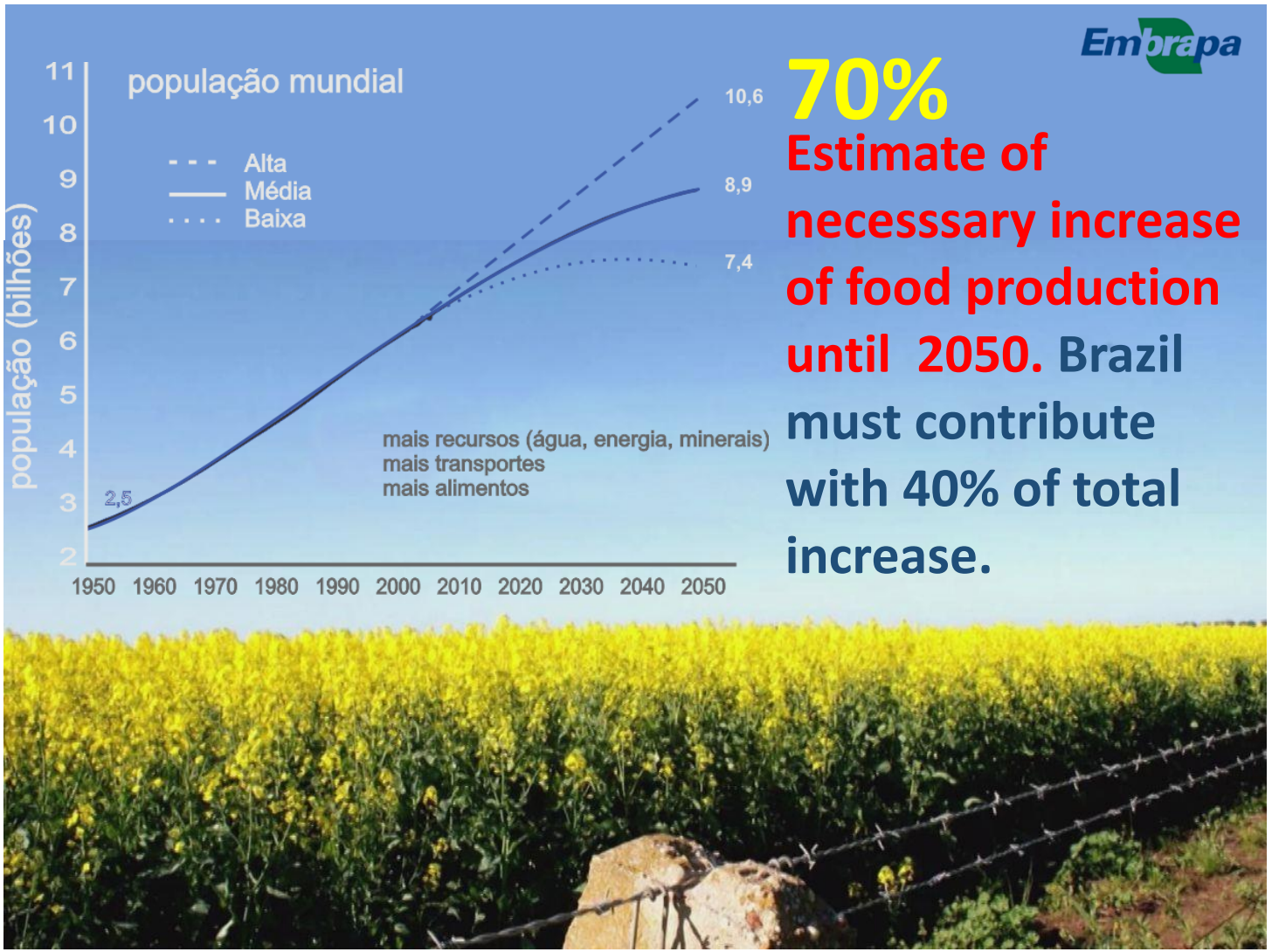
26,20
MILLIONS OF TONS
(2016)
MEAT

38,9
MILLIONS OF TONS
(2014)
FRUITS

35,2
BILLIONS OF LITERS
(2014)
MILK

Sources: IBGE, CEPLA, Conab.
Adaptation and update Embrapa / SGI

Embrapa



Source: ONU/FAO – EMBRAPA – IBGE 2011

Savannah's (Cerrado's) Agriculture

The Example of Brazilian Tropical Agriculture Development

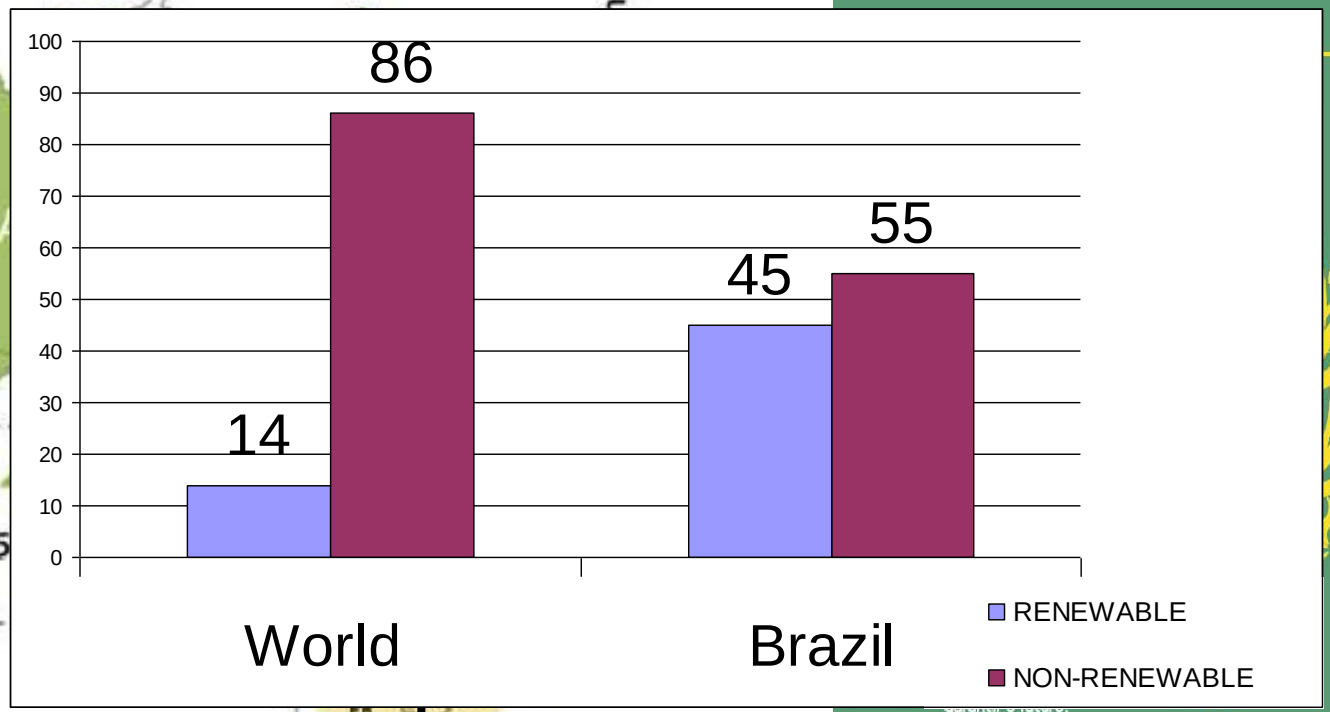
Two crops in the same year without irrigation

Sowing Corn
Second crop

Harvesting
Soybeans
First Crop

No-tillage system
Environmentally friendly

Brazil - Renewable Energy Power



Sources: NIPE-Unicamp, IBGE and CTC

ISSN 1517-2627
Setembro, 2009

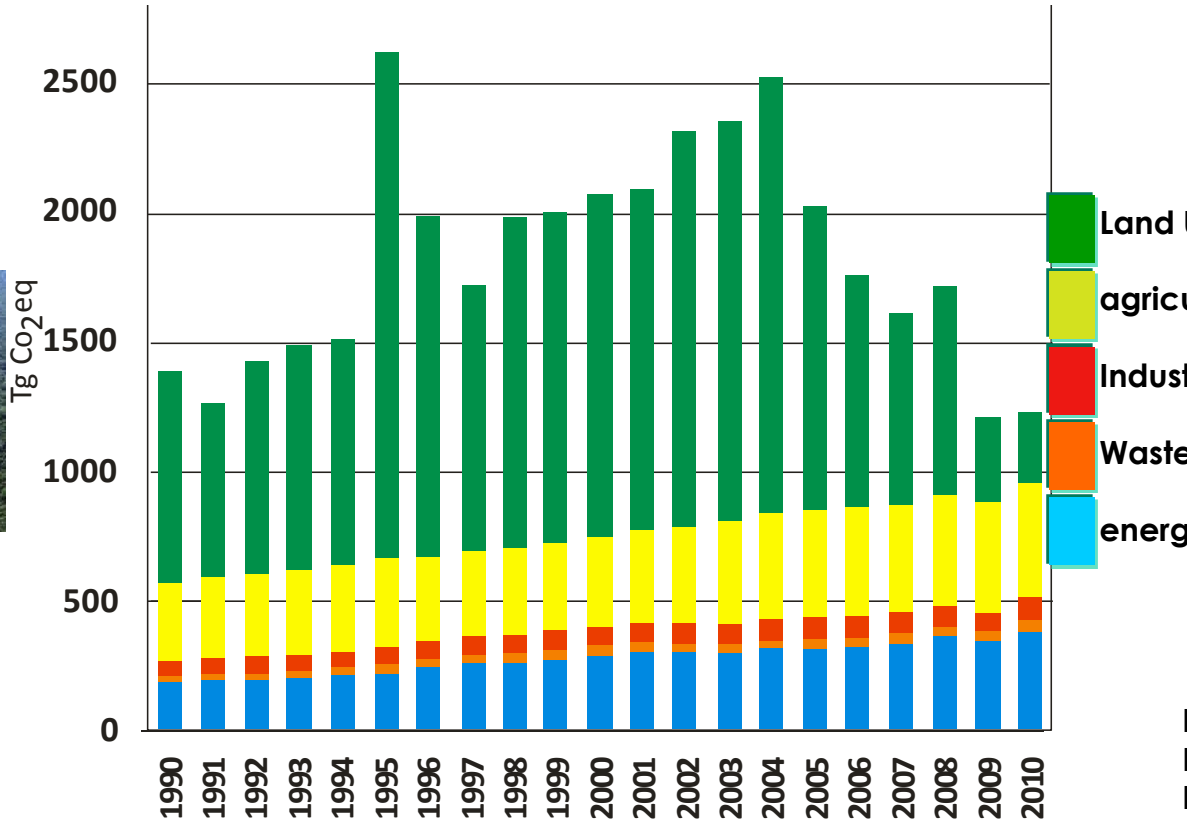
Conab CPRM IBGE Embrapa

Ministério da Ciência e Tecnologia | Ministério das Minas e Energias | Ministério do Planejamento, Orçamento e Gestão | Ministério do Meio Ambiente | Ministério da Agricultura, Pecuária e Abastecimento | Casa Civil

BRASIL UM PAÍS DE TODOS GOVERNO FEDERAL

87% of sugarcane production

Brazilian emissions of greenhouse gases Period 1990 – 2010 In CO_2 equivalent



Prof. Pinguelli Rosa
FBMC
Palácio do Planalto
05/06/2013

Tg = milhões de toneladas GWP CH_4: 21; GWP N_2O:310

Tg = million tons GWP CH_4: 21; GWP N_2O: 310

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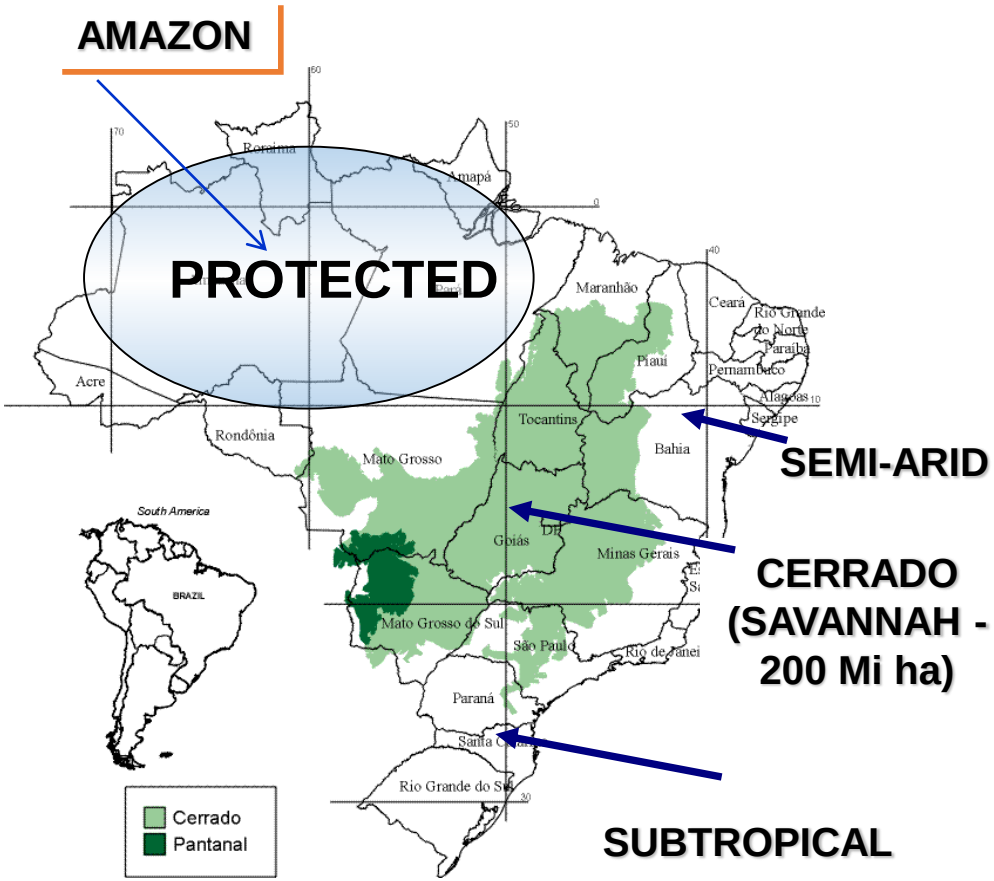
Land-Use in Brazil



Total area	850 M ha
Amazonian and other preservation areas	500 M ha
Potential of Agricultural Land	350 M ha
Today- Grains and perennial	70 M ha (sugarcane- 8 M ha; reforestation- 6 M ha)
Pasture-	190 M ha
Other Areas	90 M ha

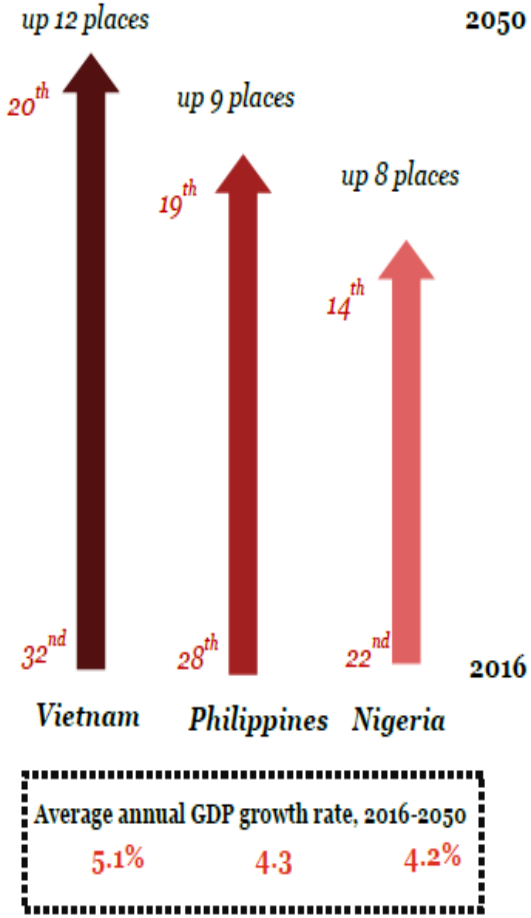
Scenarios that must affect agriculture production systems in the future

Emerging markets will dominate the world's top 10 economies in 2050 (GDP at PPPs)

	2016	2050	
China	1	1	China
US	2	2	India
India	3	3	US
Japan	4	4	Indonesia
Germany	5	5	Brazil
Russia	6	6	Russia
Brazil	7	7	Mexico
Indonesia	8	8	Japan
UK	9	9	Germany
France	10	10	UK

E7 economies G7 economies

Vietnam, the Philippines and Nigeria could make the greatest moves up the rankings by 2050



Foresights Studies

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Brazilian Agriculture- current status

B12 Sexta-feira, 12 de junho de 2015

Valor

Agronegócios

Colheita recorde de grãos será ainda maior

Correio Braziliense • Brasília, sábado, 30 de maio de 2015 • Economia • 9

Agropecuária traz alívio ao PIB

O recuo de 0,2% do Produto Interno Bruto (PIB) do primeiro trimestre ficou abaixo das estimativas do mercado (que previam queda de 0,5%), principalmente, pela ajuda da agropecuária e das exportações. Esses dois segmentos foram os únicos avaliados que cresceram na comparação com os três últimos meses de 2014, com altas de 4,7% e de 5,7%, respectivamente. O consumo do governo também contribuiu para que o resultado do PIB não fosse pior. Apesar do recuo de 1,3% desse indicador na comparação com o trimestre anterior, em relação ao mesmo período de 2014, a queda, de 1,5%, acabou sendo menor do que a de 1,6% na atividade econômica.

Além disso, a análise da despesa feita pelo Instituto Brasileiro de Geografia e Estatística (IBGE), mostra que o consumo

do governo cresceu 0,4% no acumulado em 12 meses, refletindo a ...

abaixo da alta de 4% registrada na comparação do primeiro trimestre ...

Reportagem Especial

A economia que cresce

AGRONEGÓCIO IGNORA CRISE E BATE RECORDES

Safra de soja deve ultrapassar este ano a barreira das 100 milhões de toneladas

El Niño

Apesar do clima, soja deve atingir 100 milhões de toneladas

O BRASIL QUE DÁ CERTO

AGRONEGÓCIO

Agronegócio agora quebra fronteiras na rentabilidade

Com o fim do ciclo de alta das **commodities**, setor concentra esforços no uso da tecnologia, na **gestão** da propriedade e na **agregação de valor**

PRODUTIVIDADE

Integração de culturas eleva renda no campo

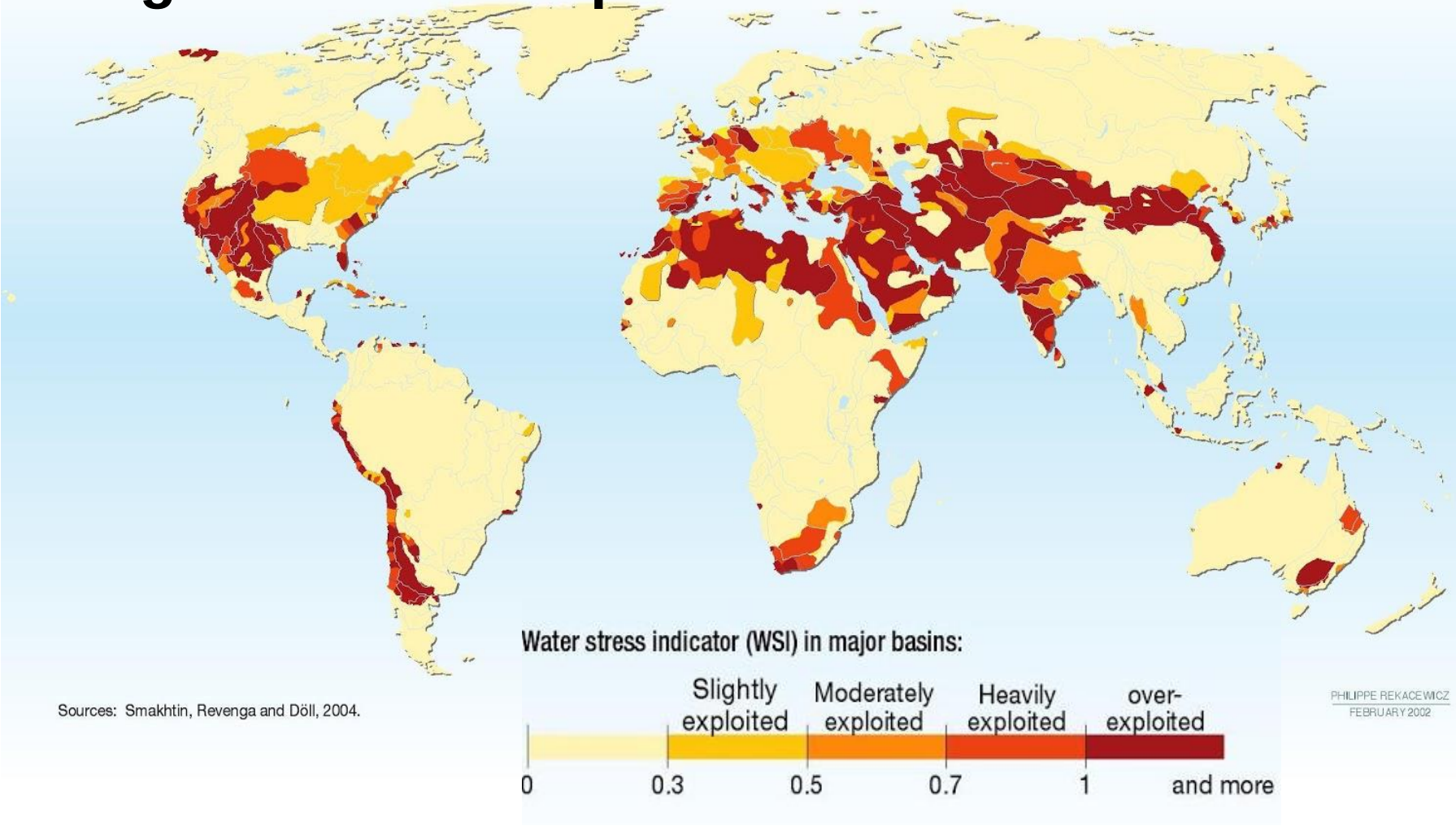
CONSUMO

Novos hábitos mantêm expansão de orgânicos

INDÚSTRIA

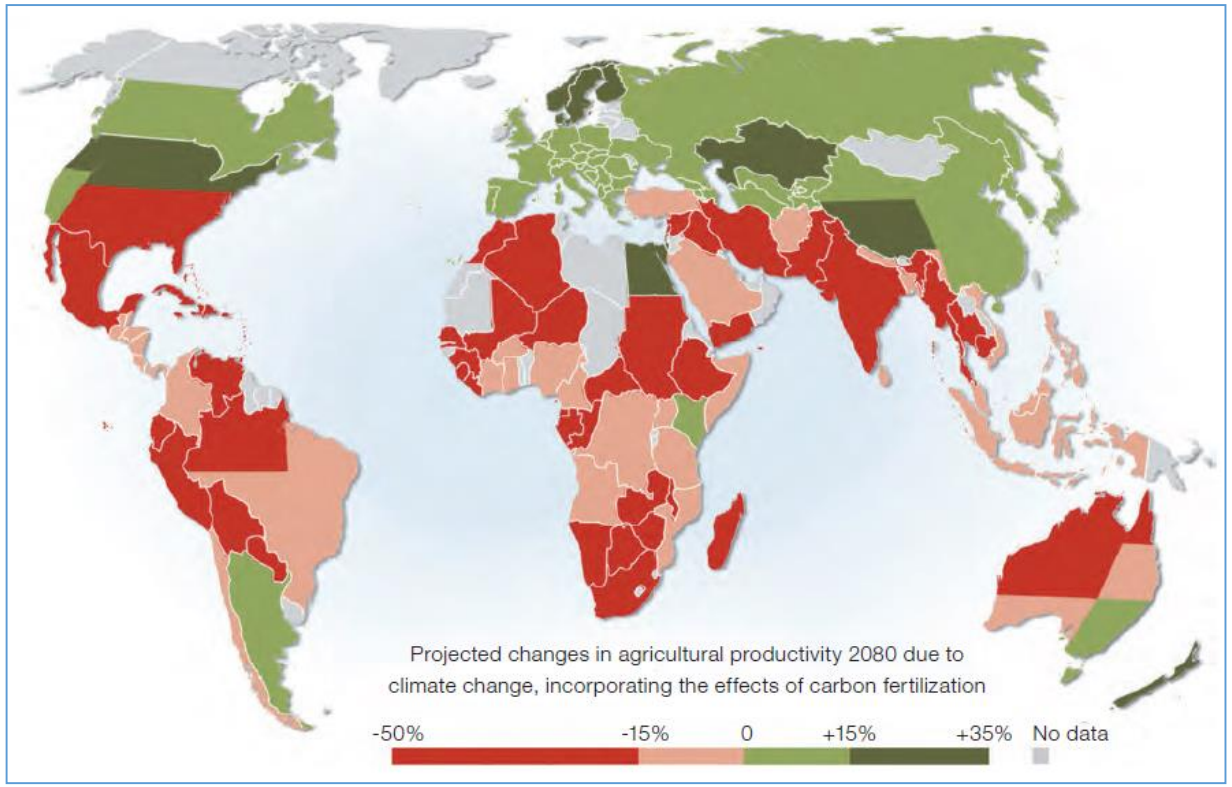
País avança na busca por valor agregado

Water stress indicator (WSI) in major basins
Irrigation- consumption of 70% of world water



Sources: Smakhtin, Revenga and Döll, 2004.

Impact of Climate Change on Agriculture by 2080



The poorest areas of the globe are the most challenging to agriculture -

Intense biotic (pests) and abiotic (drought, flood, soil acidity, low nutrients, etc) stresses.
All these challenges will be intensified with the global climatic changes.

Source: based on Cline, W. R. 2007. Global Warming and Agriculture: Impact Estimates by Country. Washington D.C.: Peterson Institute
Available at: http://www.unep.org/geo/pdfs/geo5/GEO5_report_full_en.pd

Technology is the main factor to explain the growth of Brazilian agriculture

Contribution of production factors: land, work and technology to increase of production

Variable	1995/96 %	2006 %
Work	31,3	22,3
Land	18,1	9,6
Tecnology	**50,6**	**68,1**
Total	***100,0***	***100,0***

Source: IBGE, elaboration Eliseu Alves et al. (2012).

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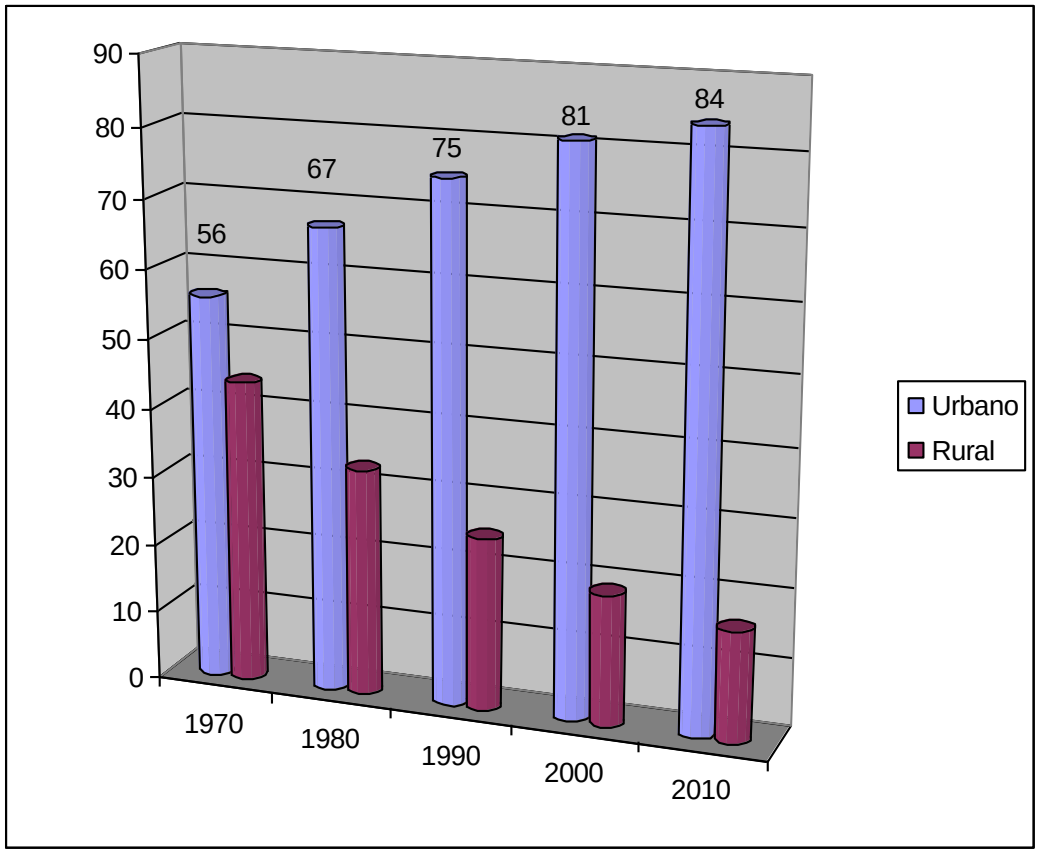
Population Residence in Brazil Urban and Rural



Source: IBGE – Demographic Census 1970, 1980, 1990, 2000 e 2010.

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Convergent Technologies

New future paradigms
(Sinergy of 4 pillars)

TI

Bits

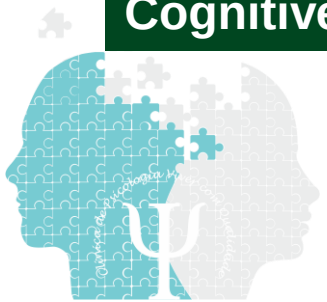
Biotecnology

Genes

Convergent Technologies

Neurons

Cognitive Science



Atoms

Nanotecnology

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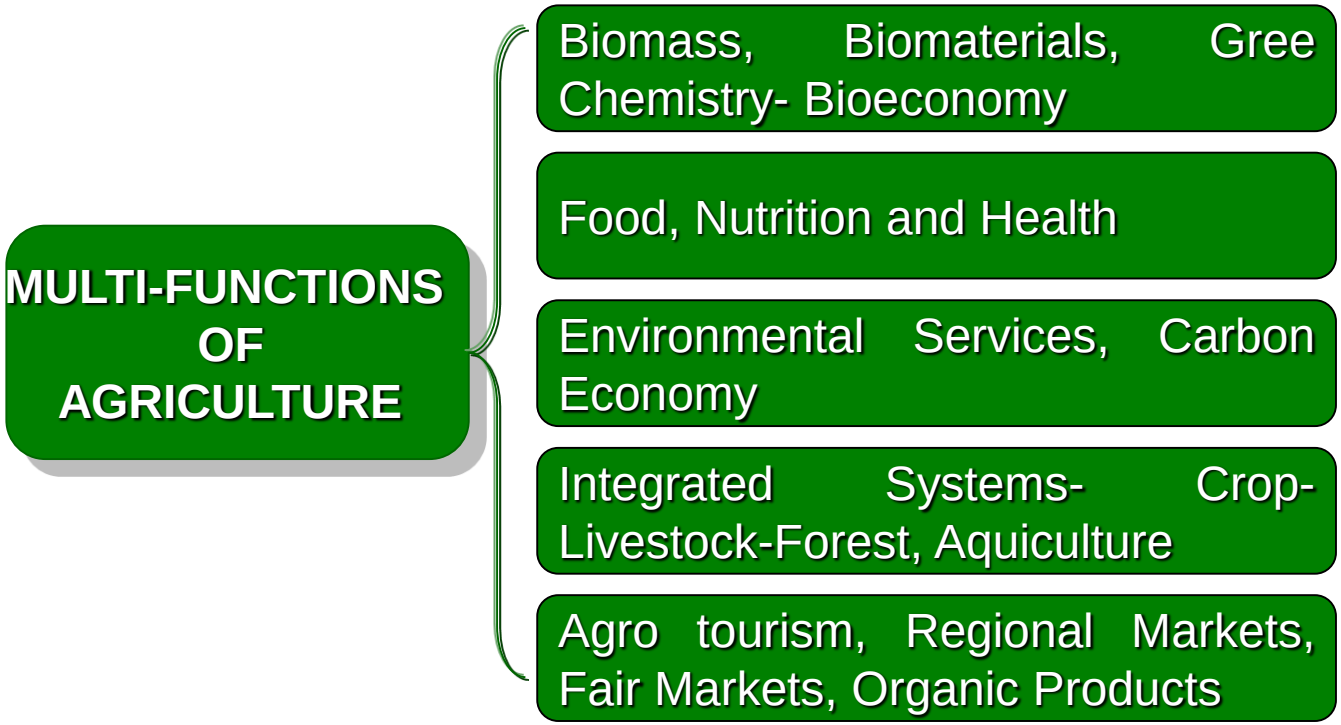
Adapted from: National Science Foundation NSF/DOC Report, 2003

AGRICULTURE- CONVENTIONAL AND NEW FUNCTIONS



Adapted from: Lopes&Contini, 2012

Big Data and Sensors (internet of Things- IoT)

Optimize use of water, fertilizers, pesticides and efficience of seeding and harvest!

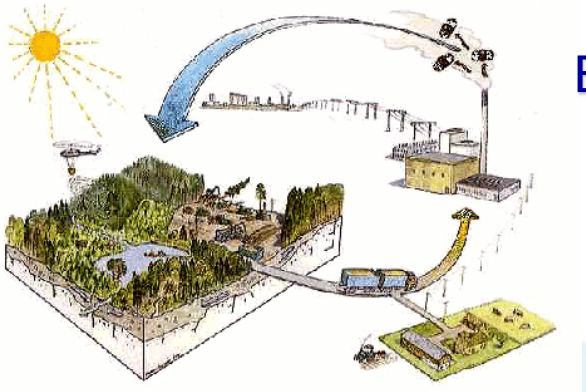
CHALLENGES/OPPORTUNITIES

Diversity

Convenience

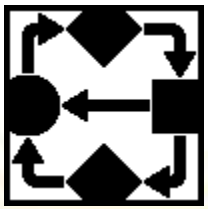
Quality

Rastreability



Bioenergy

Safety



Equity

Environment

Inovation
x
Information

Challenges/Opportunities

Funcional

Energetic

Materiais

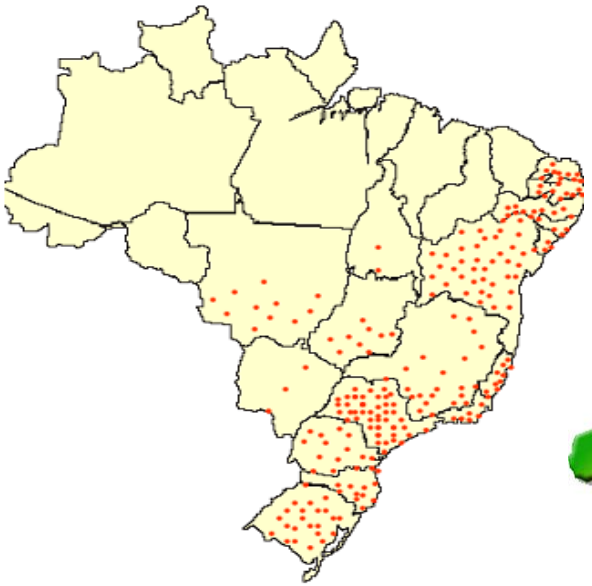
Fibers

Healthy

Soy Phytopharmacology

The Brazilian Agricultural Research System

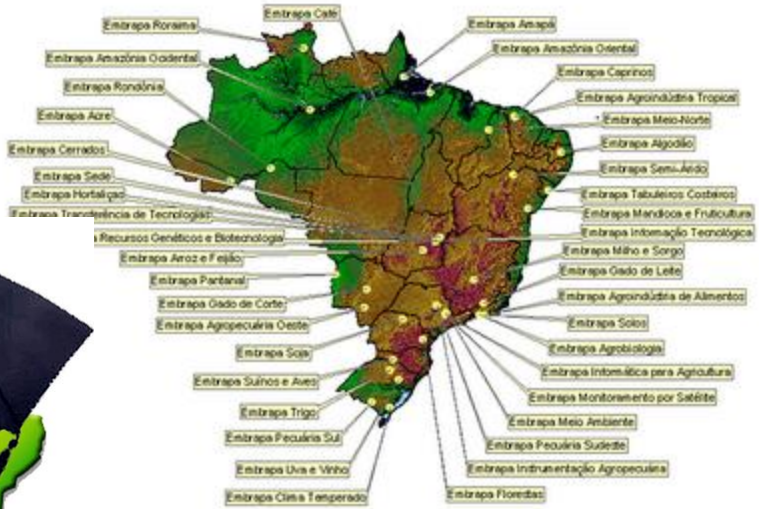
17 State Research Networks
OEPAS



CONSEPA
National Board of Agricultural Research of State Systems

70 Agricultural Universities

The Brazilian Agricultural Research Corporation
46 Embrapa Centers



Private Sector

Brazil has also an active and growing private sector, which supplies technologies and technical assistance mainly in farm inputs and food processing

Embrapa

Embrapa Network

- **Aquaculture and Fisheries -2016**
- **Cocais -2017**
- **Agrosilvopastoral-2012**
- **Agroenergy- 2010**
- Strategic Territorial Management-2012
- Quarantine Station and Plant Germplasm Exchange - 2017

- Established in 1973
- Linked to MAPA
- **Employees (total): 9,860**
- **Scientists (mainly PhDs): 2,457**
- **Analysts (Undergraduate): 2,540**
- **Budget 2017- US$ ~1 Billion**

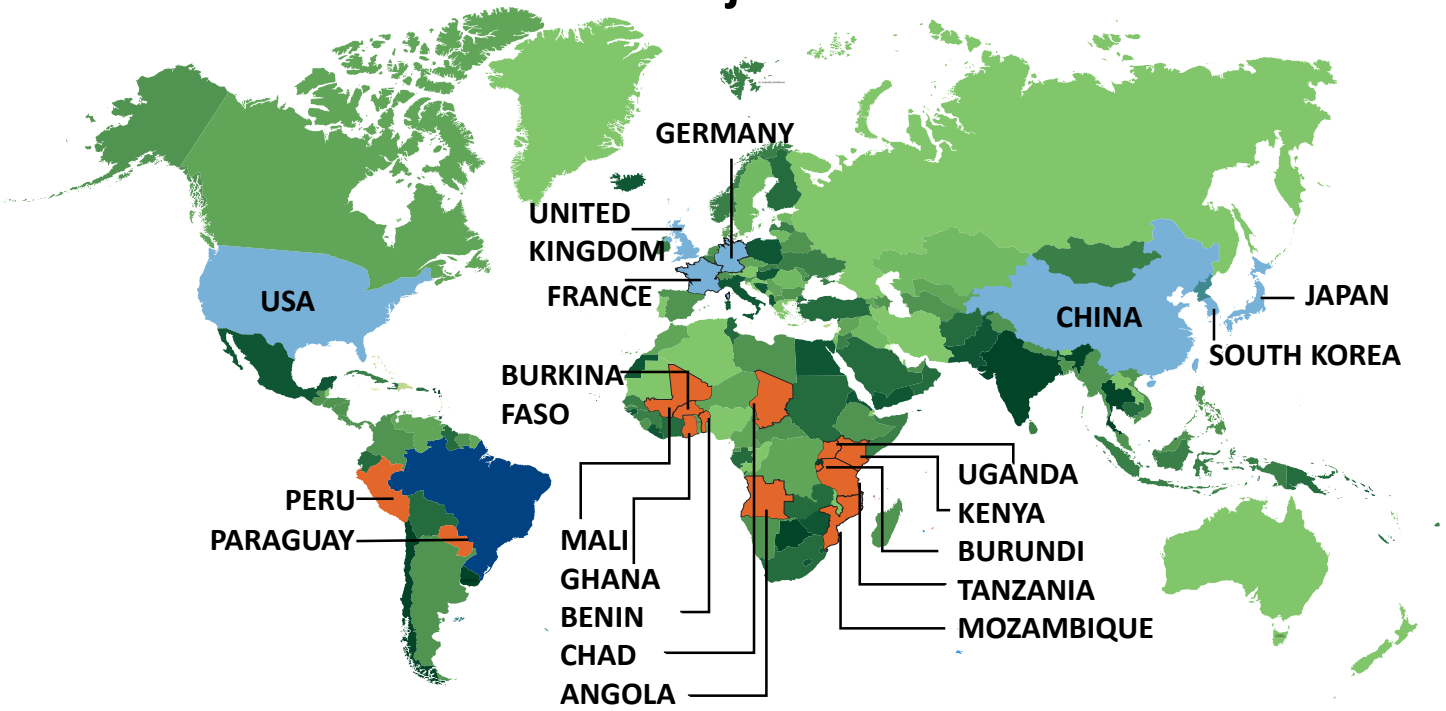
46 Research and Service Centers

- National Thematic-10
- National Product-14
- Eco regional / Agroforestry-17
- Special Services-5
- **Headquarters-**

Board - President and 3 Executive Director

17 Central Units

Embrapa's main activity focuses abroad
Embrapa Virtual Labs - LABEX
And Projects



TECHNICAL-SCIENTIFIC COOPERATION

TECHNICAL COOPERATION

Embrapa- qualified personnel

Diversified background

Renewal of 50% of scientists last 8 years

ACADEMIC BACKGROUND*	RESEARCHER	ANALIST	TOTAL	%
AGRONOMY	1345	201	1546	32
BIOLOGY	224	78	302	6
VETERINARY	147	-	147	3
FOREST ENGINEERINGENG	95	-	95	2
HUSBANDRY	88	-	88	2
CHEMISTRY	36	78	114	2
ECONOMY	28	74	102	2
LAW	-	105	105	2
JOURNALISM, PUBLIC RELATIONS (SOCIAL COMMUNICATION)	-	193	193	4
MANAGEMENT	-	272	272	6
ACCOUNTANT	-	166	166	3
OTHERS (PHYSICS, MATERIAL ENGINEERING, ELETRONIC ENGINEERIGNG, MECHANICAL ENGINEERING, CHEMICAL ENGINEERING, FOOD ENGINEERING)	468	1284	1752	36
TOTAL	2431	2451	4882	

*ONLY ACADEMIC BACKGRUND - NOT NECESSARILY MEAN WORK AREA IN EMBRARPA.

Embrapa

Strategic Intelligence Platform of Embrapa
"AGROPENSA"

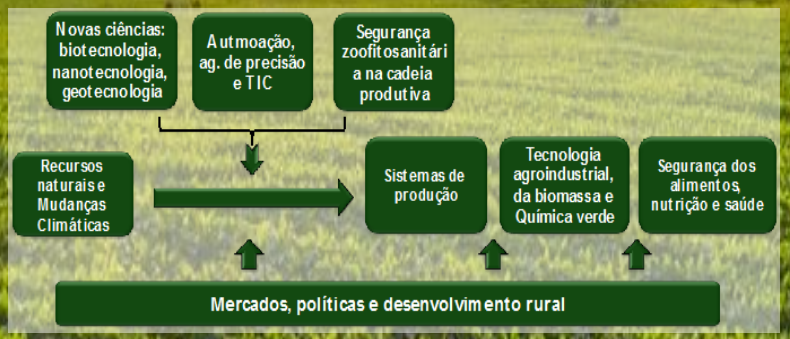
Visão 2014-2034: o futuro do desenvolvimento tecnológico na agricultura brasileira

agropensa

Embrapa

I - Forças motrizes para os sistemas agroalimentar e agroindustrial

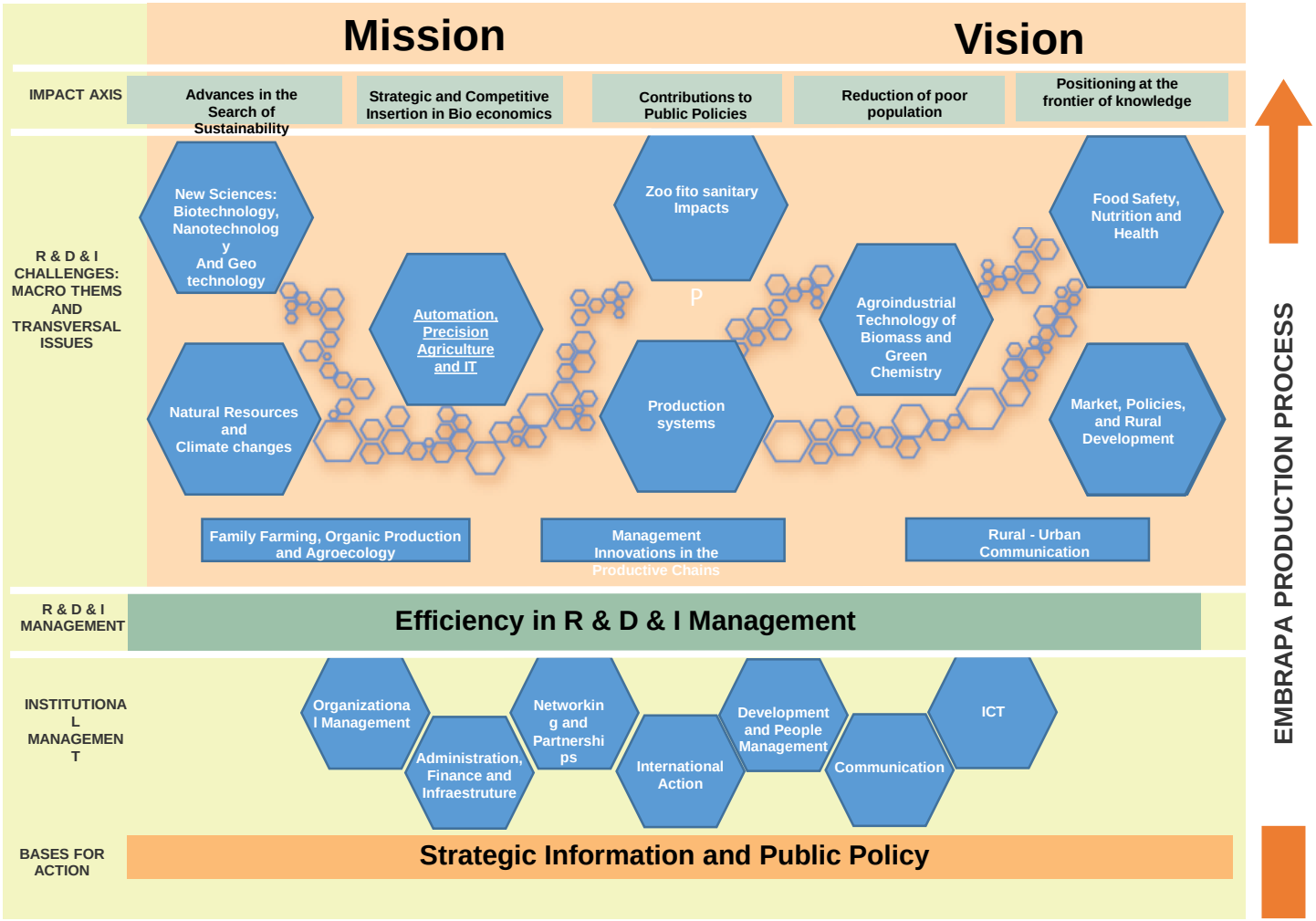
II – Desdobramentos tecnológicos



III – Visão 2014-2034 (eixos de grande impacto)

VI Strategic Planning of Embrapa

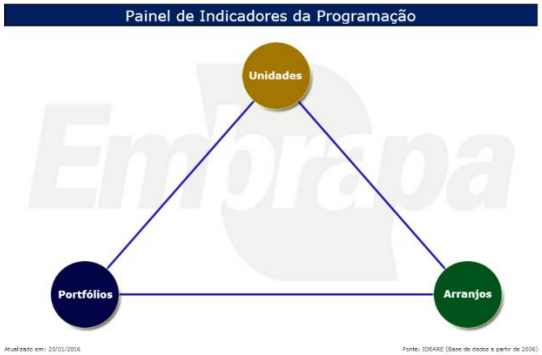
Strategic Plan- VI Master Plan Embrapa 2014-2034



Management and Monitoring of Embrapa Projects - IT Tools (reference: PMBOK)

Ideare: submission and evaluation

Quaesta
Embrapa Project Research



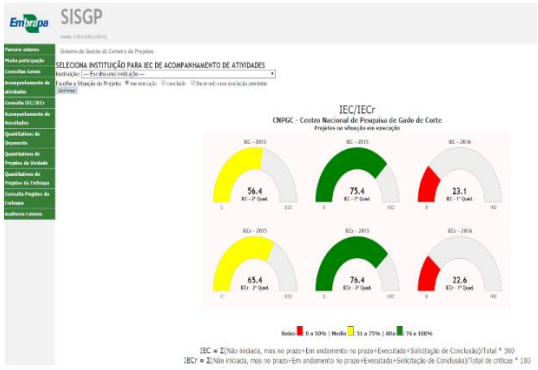
Embrapa Programming Management

Tactical component

1,153 R & D projects

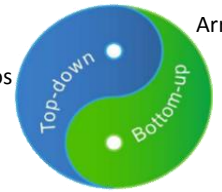
- Coordinate efforts
- Group projects in related topics
- Incrementar sinergia e complementariedade
- Systematize skills
- Give greater prominence to the Decentralized Units
- Exercising the concept of "Project Networks"

SISGP: monitoring



Quaesta - Search Tool

New instruments of management support



Top - down - 25 Portfolios

Bottom - up - 80 Arrangements

External Advisory Committee for 46 Research Centers

PORTARIA N° 693, de 19.05.2016. 1. Designa Ladislau Martin Neto, Diretor-Executivo (DE/P&D), presidente, Cláudio Takao Karia, Chefe-Geral (CPAC), secretário executivo, Paulo do Carmo Martins, Chefe-Geral (CNPGL), e Carlos Alberto Arrabal Arias, Pesquisador (CNPSO), membros da Embrapa, Thelma Krug, Vice-Presidente Mundial do Painel Intergovemamental de Mudanças Climáticas - IPCC, Paulo Renato Herrmann, Presidente da John Deere Brasil, Eduardo de Lima Leduc, Vice-Presidente Senior da Unidade de Proteção de Cultivos para América Latina da BASF S.A., Alberto Hercílio Broch, Presidente da Confederação Nacional dos Trabalhadores na Agricultura - CONTAG, e Edward Madureira Brasil, Secretário de Inclusão Social do Ministério da Ciência, Tecnologia e Inovação - MCTI, membros externos, para constituir o Comitê Assessor Externo - CAE do Centro de Pesquisa Agropecuária dos Cerrados - CPAC. 2. Os membros do CAE têm mandato de 3 (três) anos, podendo ser reconduzido por igual período, conforme disposto na subseção 4.5.7 da Norma 037.005.002.001 (Organização e Funcionamento do Comitê Assessor Externo - CAE), aprovado pela Resolução Normativa n° 15, de 15.06.2015 (BCA n° 26, de 15.06.2015).

PORTARIA N° 694, de 19.05.2016. Revoga a Portaria n° 530, de 18.04.2016, que constituiu o Comitê Assessor Externo - CAE do Centro de Pesquisa Agropecuária de

Maurício Antônio Lopes
Presidente

The **External Advisory Committee** is an advisory body, established with the purpose of capturing the signals and demands of the private sector, and to monitor the trends and the scenarios of C & T & I that are relevant to the planning and programming of Embrapa. Total of 9 members, 5 of them from private companies and other institutions.

External Advisory Committee
Embrapa Cerrados

R & D Topics

Focus on productive chains and strategic themes for Brazilian agriculture

- ✓ Soy
- ✓ Corn
- ✓ Rice
- ✓ Bean
- ✓ Wheat
- ✓ Cotton
- ✓ Meat
- ✓ Milk
- ✓ Fruits
- ✓ Vegetable
- ✓ 72 genetic breeding programs (vegetal and animal)

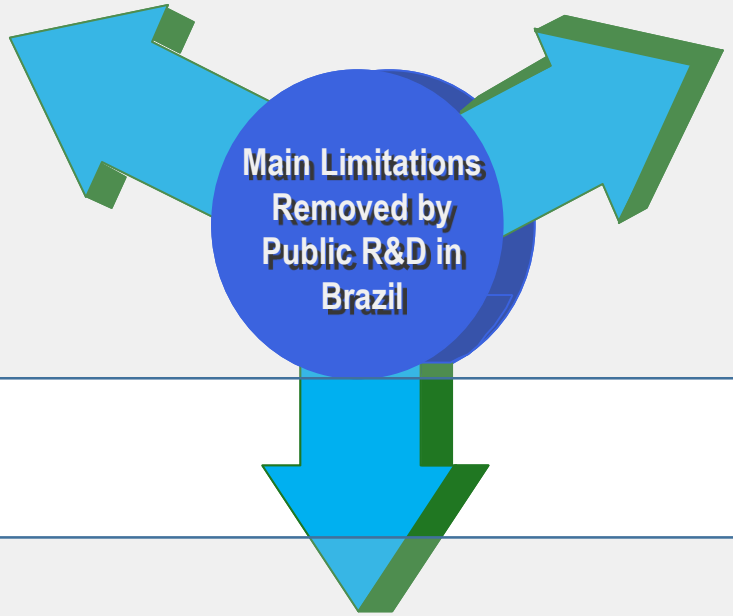
- ✓ Agroindustry
- ✓ Automation
- ✓ Aquaculture
- ✓ Genetic Engineering
- ✓ Irrigation
- ✓ Integrated Systems- CLF
- ✓ Biological Nitrogen Fixation
- ✓ Climate change
- ✓ Animal Health
- ✓ Plant Health
- ✓ Sugar and alcohol industry
- ✓ ...

Embrapa

Key technologies that contributed to the Cerrados agriculture

The 1st revolution

Transformation of acidic, poor soils into fertile land



"Tropicalization" of crops and animal production systems

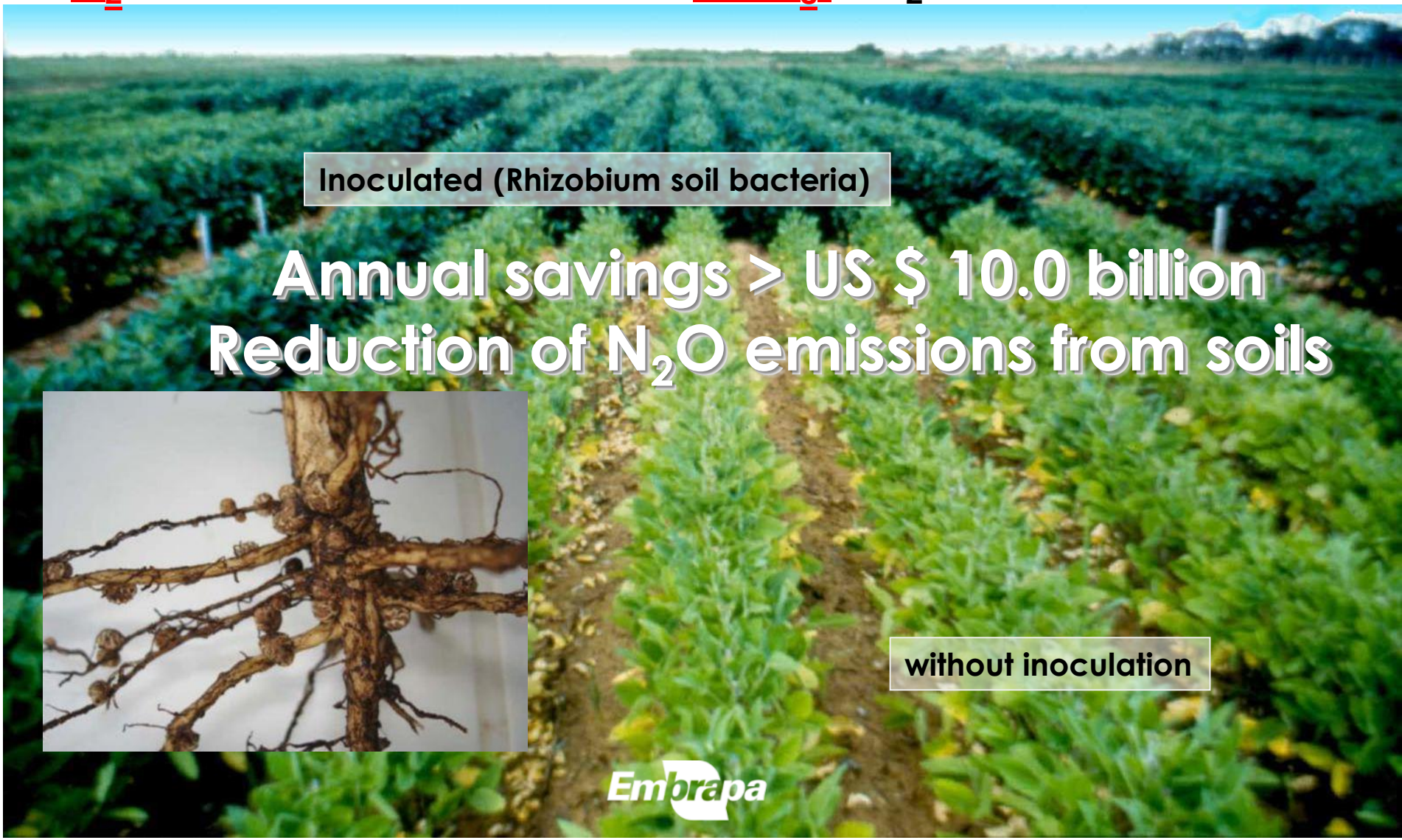
Development of a Platform of Sustainable Practices

The 2nd revolution

Embrapa

Biological Nitrogen Fixation (BNF): Soybean Inoculation

$N_2 + 16\ ATP + 8\ e^- + 8H^+ \rightarrow 2\ NH_3 + H_2 + 16\ ADP + 16\ Pi$



Low Carbon Agriculture Plan

Commitments of Agriculture 2010 – 2020

(Area in million hectares, volume in million m^3, reduced GHG million tons CO_2 equivalent)

Subprograms	Objectives 2011/2015	Objectives 2016/2020	Estimated reduction of GHG (in 2020) million tons CO_2 equivalent
Recovery of degraded pastureland (ha)	6.0	9.0	83-104
Integrated Crop-Livestock-Forest Systems (ha)	1.5	2.5	18 - 22
Tillage System (ha)	2.8	5.2	16 - 20
Biological Nitrogen Fixation (ha)	1.0	4.5	10
Planted forests (ha)	1.0	2.0	8 -10
Treatment of animal wastes(million m^3)	-	4.4	6.9
Fonte: Brazil, 2011d.			
Total			**133,9 to 162,9**

[1] Through appropriate management and fertilization.

[2] Including Agroforestry Systems (AFS).

[3] Not computed the Brazilian commitment to the steel industry; and it was not accounted for the GHG emission mitigation potential.

Embrapa

abc AGRICULTURA DE BAIXO CARBONO

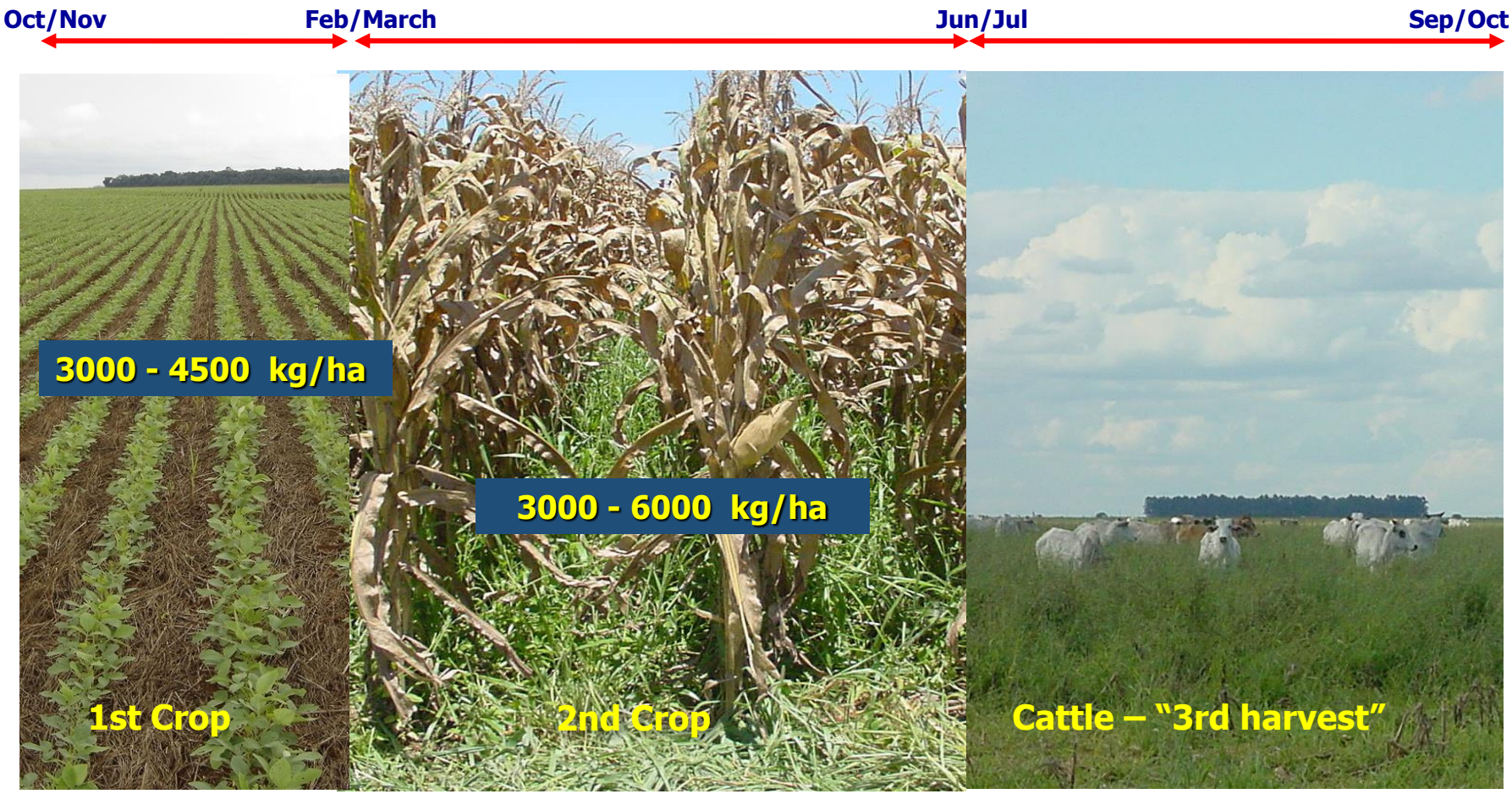
Support Network to CLF Integrated System

Began in **2012**

97 Technological Reference Unities in all Brazilian biomes (public and private experimental fields

19 Embrapa`s Centers.

Sustainable Intensification: crop + livestock



Source: Embrapa Cerrados

Sustainable Intensification: crop + livestock/ forest (ICLF)
The third revolution

Soybean ± 42% of the time

Corn ± 50% of the time

Soybean + 2nd harvest Corn ± 80% of the time

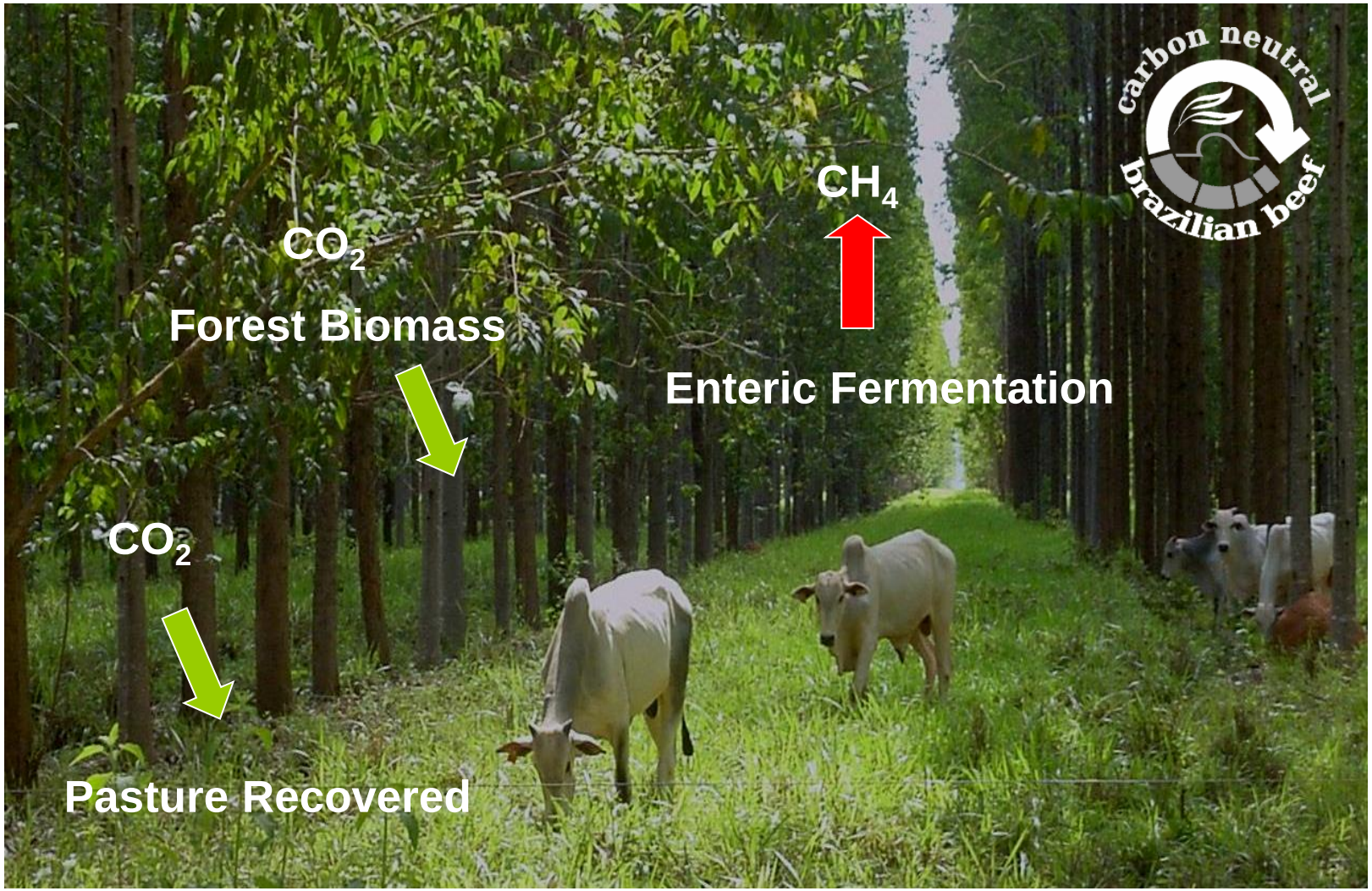
Soybean + 2nd harvest Corn + pasture ± 92% of the time

Corn + Braquiária/Pasture ± 92% of the time(± 8%)

Embrapa

Integrated Crop-Livestock-Forest Systems

Agricultural Sustainable Intensification



cocamar COOPERATIVA AGROINDUSTRIAL · DOW · Dow AgroSciences · JOHN DEERE · Parker · syngenta · Embrapa

Edition of November 2016

Survey of CLF Integrated Support Network (via Kleffmann Consultants) is main topic of Globo Rural Magazine in November/16

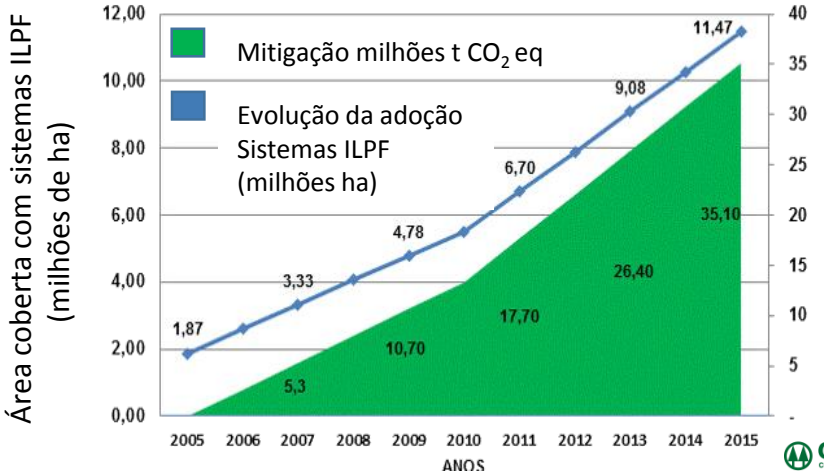
Brazil addressed more one of its goals, established in 2009 in Copenhagen COP, with current 11.5 million of hectares on CLF integrated systems (majority are crop-livestock areas).

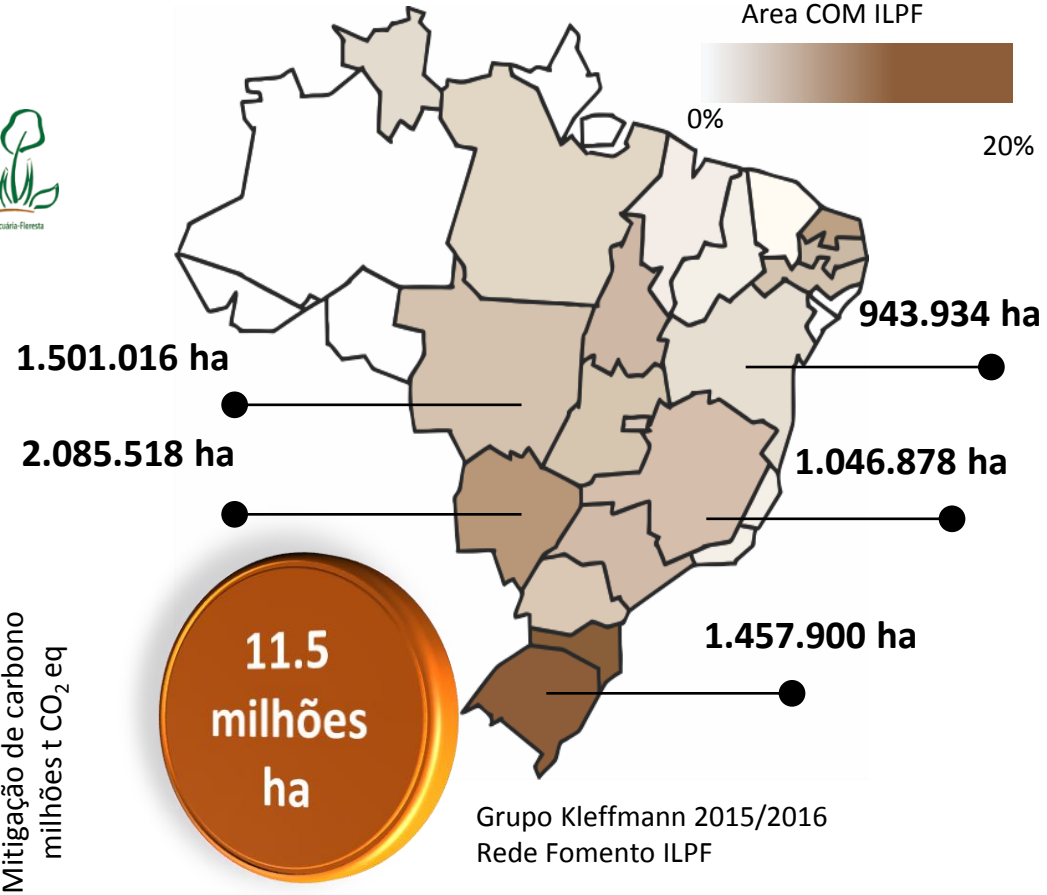
Adoção de ILPF no Brasil
Pesquisa Rede de Fomento ILPF e Kleffmann Group

Evolução da adoção:
2005-2010 – 3,6 milhões de ha
2010-2015 – 6 milhões de ha

Evolução de mitigação:
2005-2010 – 13,3 milhões t CO_2 eq
2010-2015 – 21,8 milhões t CO_2 eq

Elaboração: Plataforma ABC, 2016





Rede de Fomento à iLPF

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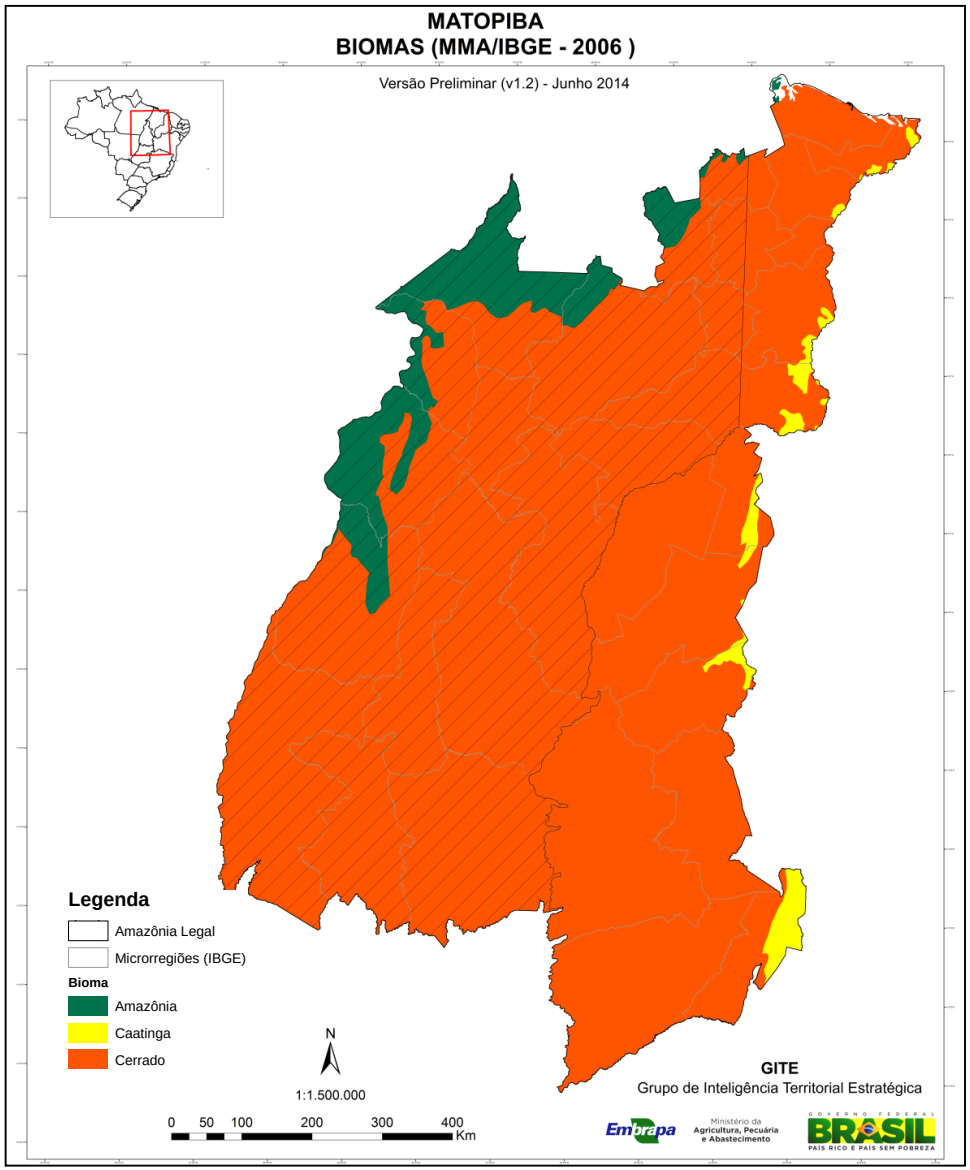
GEOSPACIAL STUDIES AND DATA- MAPS

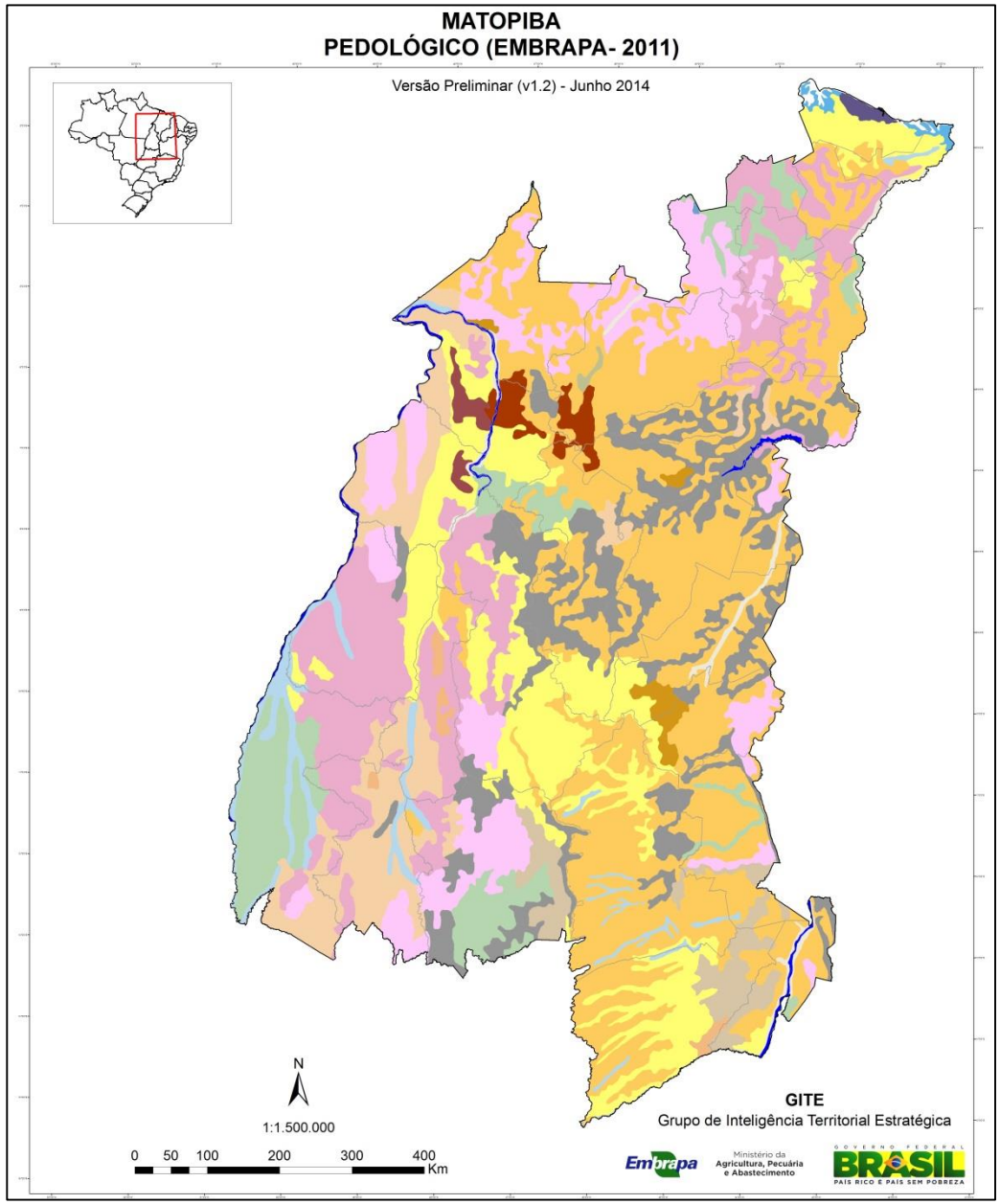
BIOMES



- Biomes of MATOPIBA: **03**

Biomes	Area (Ha)	% of MATOPIBA
Cerrado	66.543.540,87	90,94%
Amazonia	5.319.628,40	7,27%
Caatinga	1.203.107,22	1,64%

* Valores calculados. Projeção Cônica de Albers – Sirgas 2000.



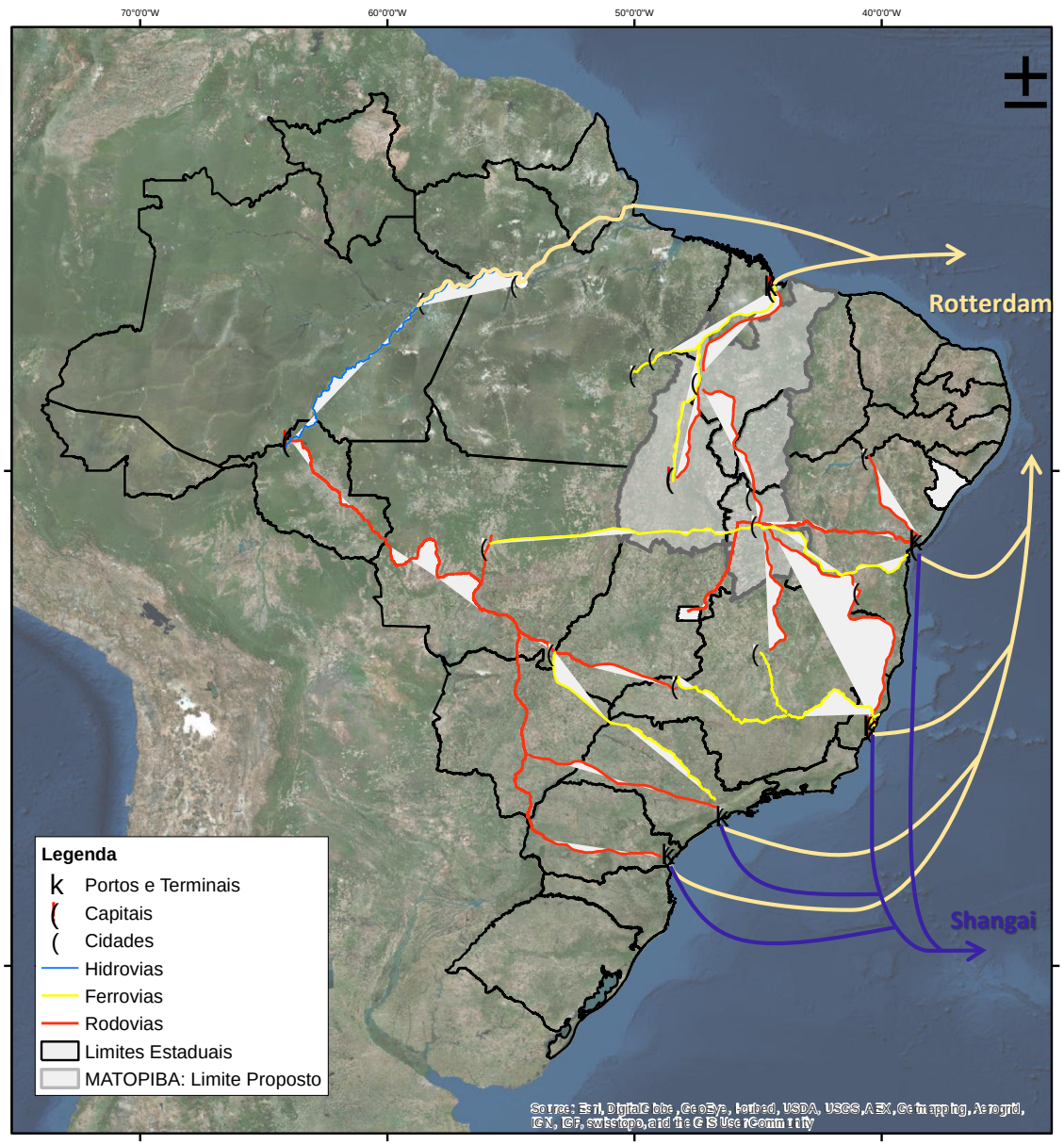
SOIL CHARACTERISTICS

Legenda

- MATOPIBA - Limite Proposto
- Microrregiões - IBGE

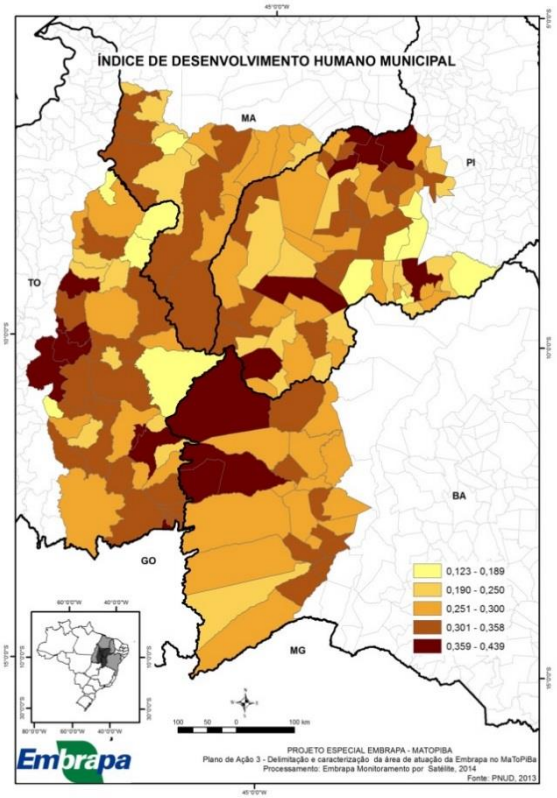
Solos - 2° nível hierárquico (EMBRAPA, 2011)

- Argissolo Vermelho-Amarelo
- Cambissolo Háplico
- Chernossolo Argilúvico
- Dunas
- Gleissolo Háplico
- Gleissolo Sálico
- Gleissolo Tiomórfico
- Latossolo Amarelo
- Latossolo Vermelho
- Latossolo Vermelho-Amarelo
- Luvissolo Crômico
- Massa d'Água
- Neossolo Flúvico
- Neossolo Litólico
- Neossolo Quartzarênico
- Nitossolo Vermelho
- Planossolo Háplico
- Plintossolo Háplico
- Plintossolo Pétrico
- Vertissolo Háplico

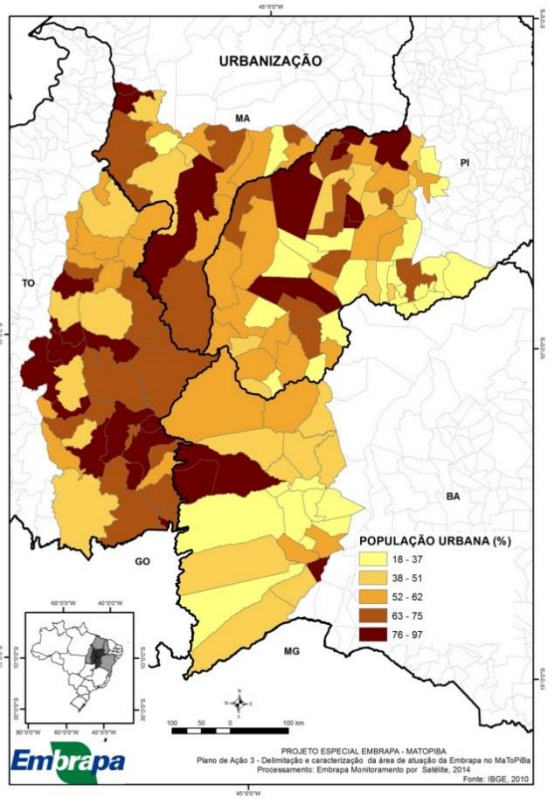


Infrastructure and Logistic

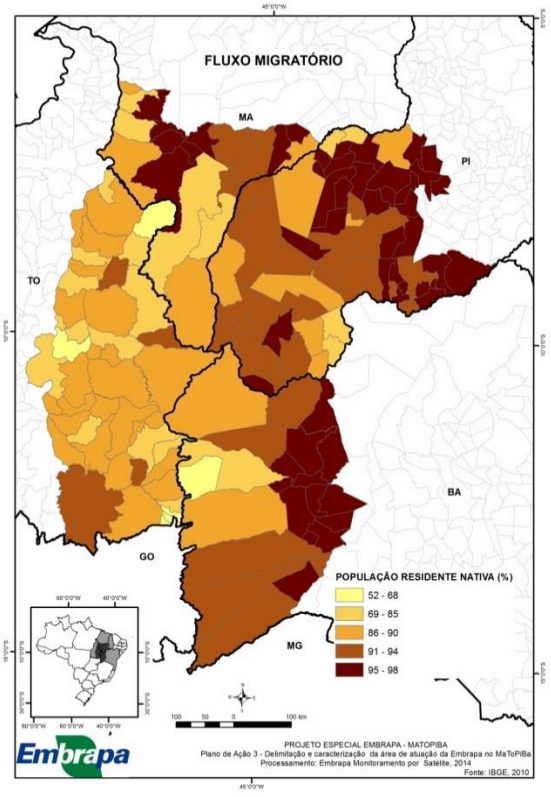
Socio-economic aspects of cities of Matopiba



HDI Cities



Urbanization



Migratory Flux

Coordenação: Edson Bolfe, CNPM

Agricultural Zoning Climate Risk

It is an agricultural policy instrument and risk management in agriculture. The study is developed in order to minimize the risks related to weather events and allows each municipality to identify the best time of planting crops in different soil types and cultivars cycles.

Step 1: EMBRAPA (methodology)

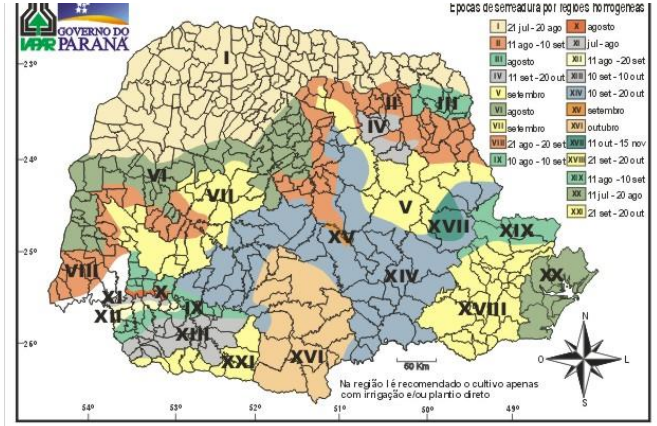
Step 2: Simulation with climate data and risk parameters.

- + 3500 climatological stations
- time series with at least **20 years of daily data**
- List of municipalities that meet the risk criteria defined by the **Ministry of Agriculture, Livestock and Food Supply.**

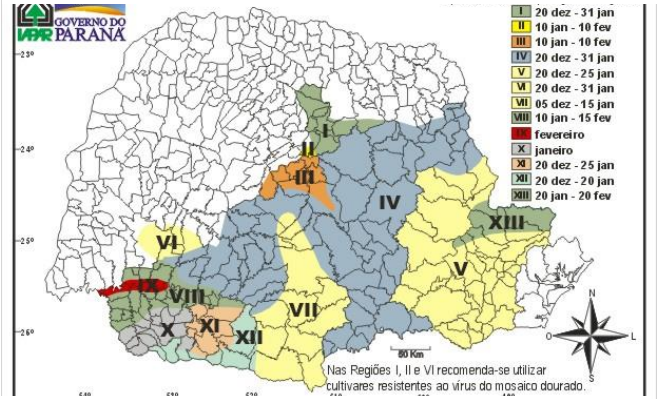
Embrapa

State of Parana, Brazil

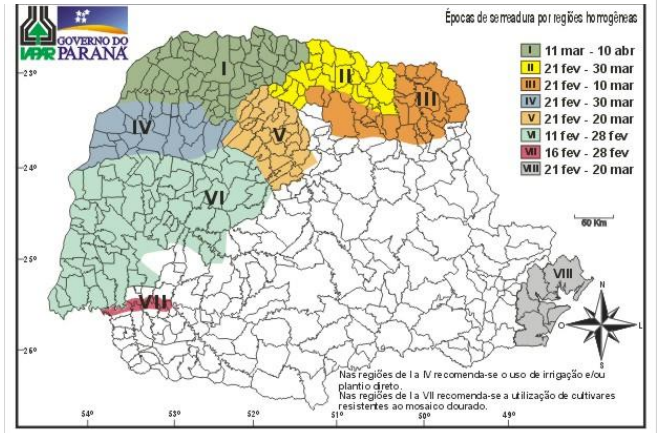
bean crop zoning in the rainy season



bean crop zoning in the dry season



bean crop zoning autumn / winter

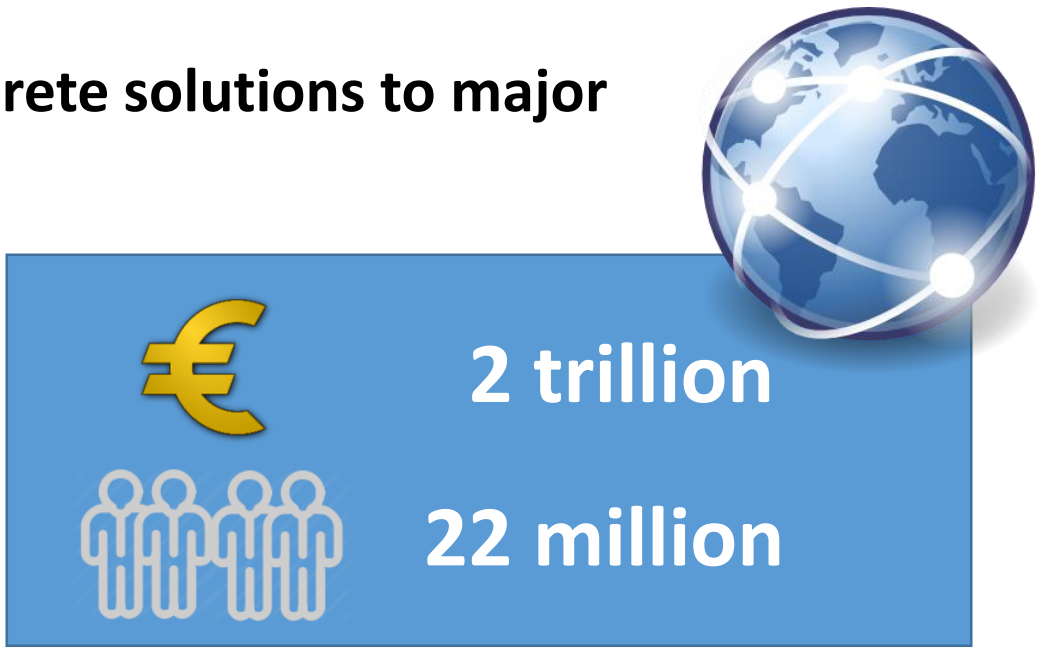


Bioeconomy

It is a sustainable economy, which brings together all sectors of the economy using biological resources

Coherent, effective and concrete solutions to major societal challenges:

- The economic crisis,
  climate changes,
  replacement of fossil resources,
  food security and health.

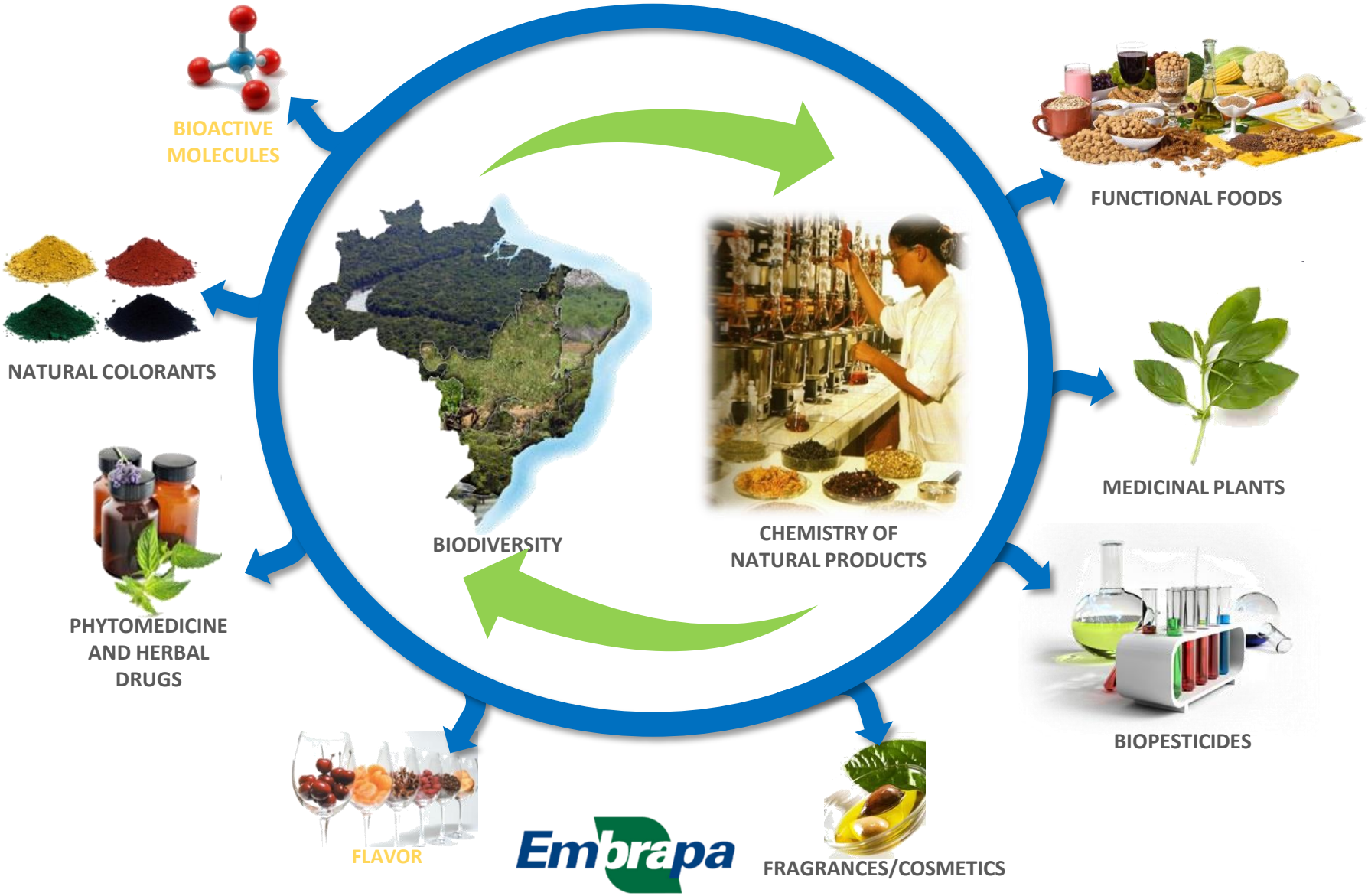


Source: FIESP with Organization for Economic Cooperation and Development (OECD) data.

Highly dependent on:
Research in biosciences,
information technology,
robotics, materials;

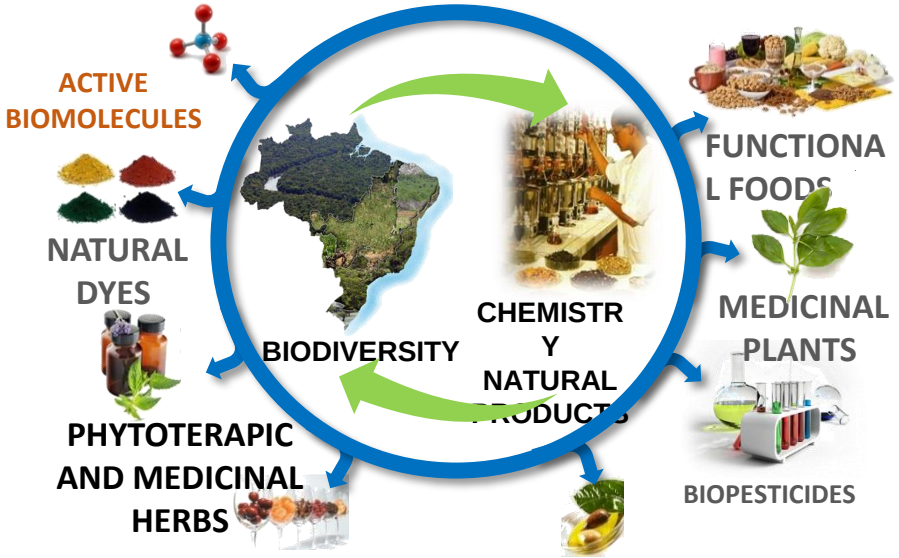
Embrapa

Adding Value to Brazilian Biodiversity



Multiusers Lab- Chemistry of Natural Products

Embrapa Agroindústria Tropical- Fortaleza/CE



Multiuser Labs- Nanotecnology and Precision Farming Ag - Embrapa Instrumentação- São Carlos-SP

National Lab of Nanotechnology for Agriculture

National Lab Precision Farming

http://www.inova.unicamp.br/parquecientifico/

Mixed Unit- Umip-GenClima – Partnership Embrapa-Unicamp

"Pipeline" Biotec Assets

Linked to Embrapa Informatics- Campinas/SP

UNICAMP

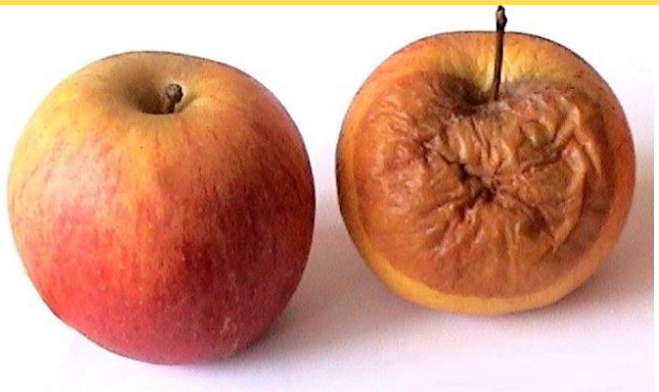
Embrapa

Edible plastic take advantage from the tropical fruit in pioneer way

The manufacture of edible plastic food includes dehydration and addition of nanomaterials to bind and similar resistance to conventional packages.

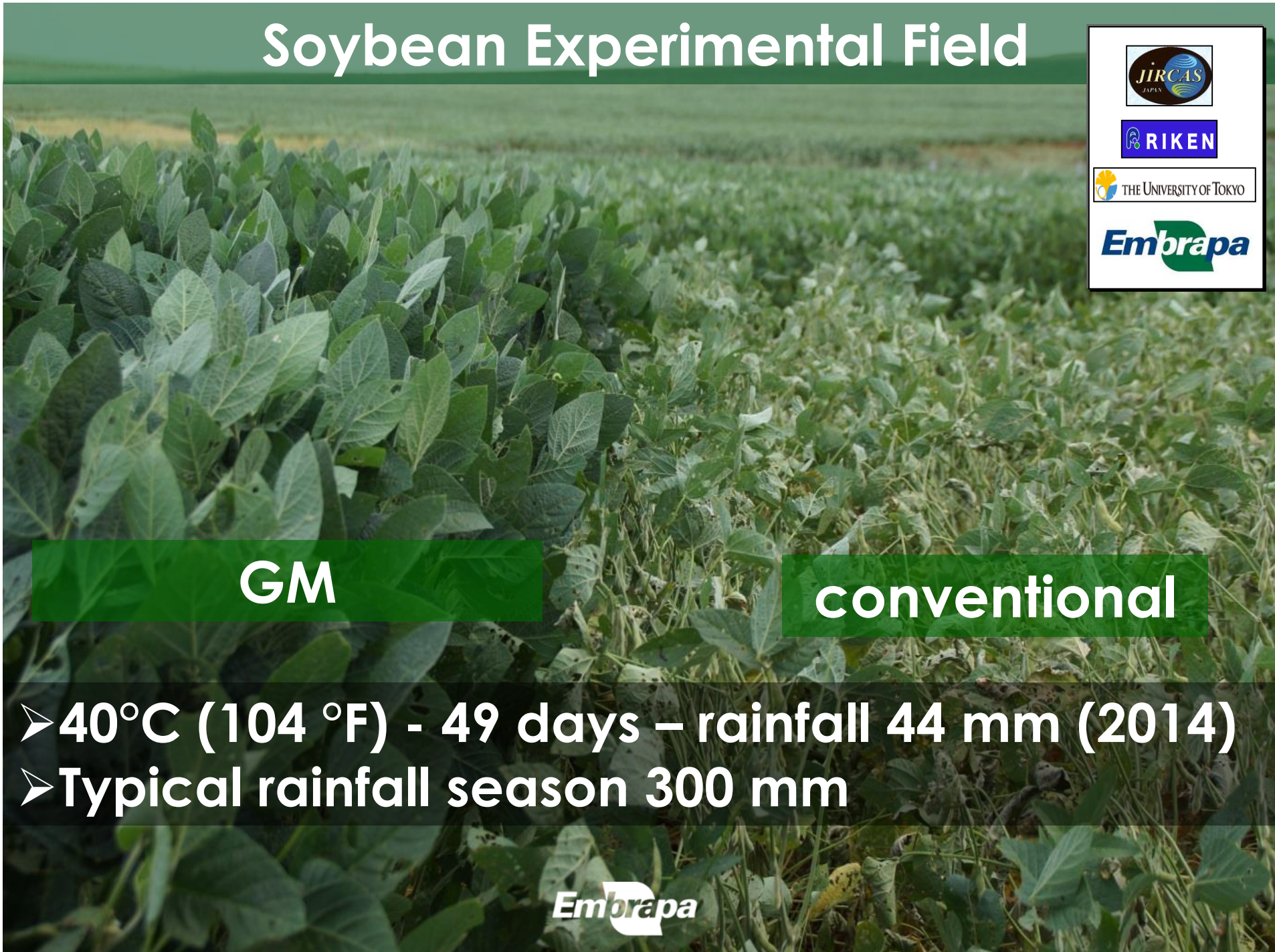
The edible films have various flavors and can be made from fruits or vegetables.

Apple coated and uncoated after 20 days stored at room temperature



Embrapa

Soybean Experimental Field



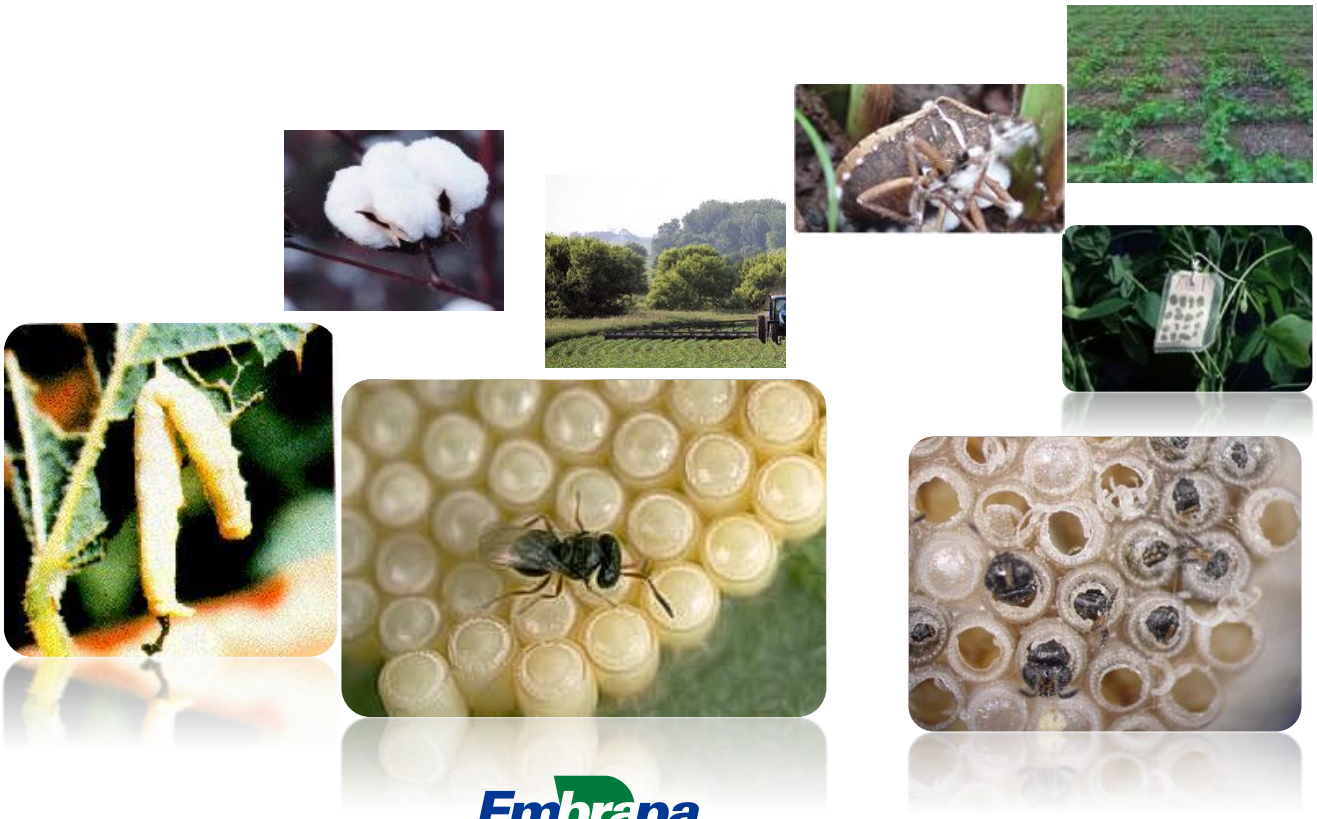
- 40°C (104 °F) - 49 days – rainfall 44 mm (2014)
- Typical rainfall season 300 mm

Engineering (GM) soybean seeds as a scalable platform to produce cyanovirin-N, a non-ARV microbicide against HIV

Genetic Bank- Embrapa

- Back-up of all Embrapa's collections
- Located in Brasília- Embrapa Genetic Resources and Biotech
- 700.000 samples capacity
- ALELO- Data Base -vegetal, animal and microorganisms origin samples
- Launched 2014
- Third largest in the World

Integrated Pest Management- Biological control importance



Strike
Bem-estar e limpeza que impressionam.

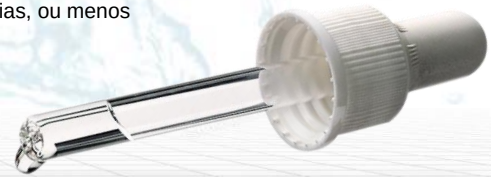
BIO-BTI

É um inseticida microbiano, biológico eficaz contra larvas de mosquitos das espécies *Aedes aegypti* e *Culex* ssp., em diversos habitats.

Ovos | Larvas | Pupa | Mosquito

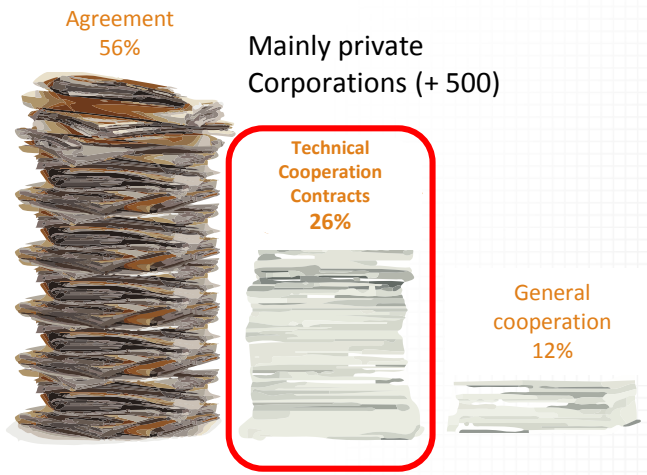
Aplicar uma gota do produto nos locais de água parada.

Repetir o processo a cada 15 dias, ou menos em caso de enxurrada.



In the Market in 2017

Current National Cooperation contracts (2014)



Fonte: SAIC/Embrapa SNE - Abril/2015

Current International Cooperation contracts (1081)

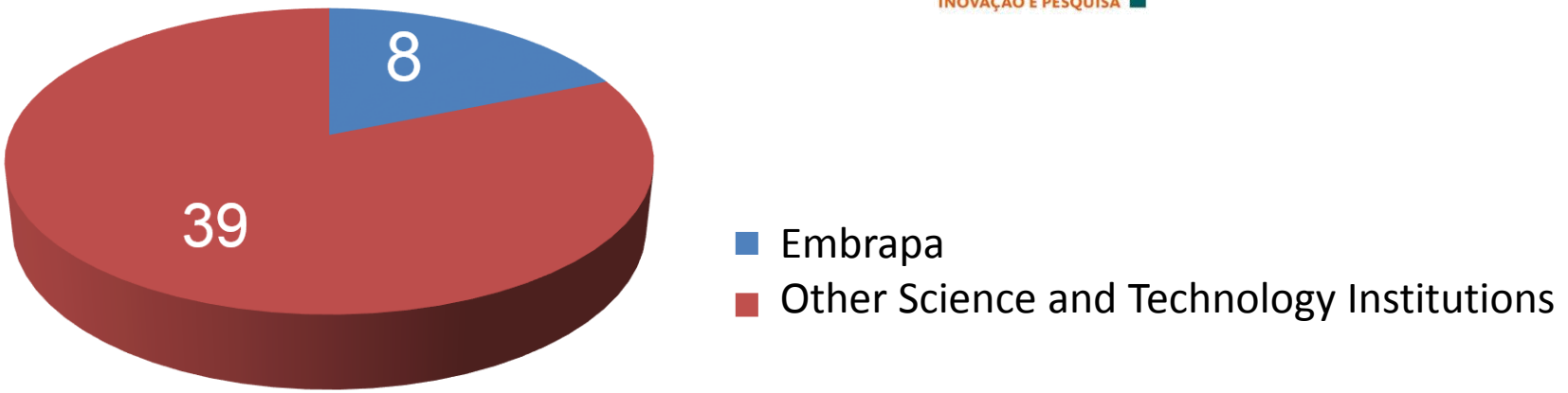
Source: SAIC/ Embrtapa SNE – April/2015

Project of Law in Senate- PLS 222

Creation of subsidiary to improve conditions to **public-private partnerships**

Support and flexibility to create spin-offs and startups

INOVA AGRO



Plans approved

92 participating STIs

47 Approved Business Plans

8 Embrapa Work Plans (17%)

INOVA AGRO

Finep INOVAÇÃO E PESQUISA BNDES

Biological control *Helicoverpa armigera*
(Embrapa CENARGEN/ IMAmt)
R$ 7,5 millions

Treatment of swine manure - Composting and organic fertilizers (Embrapa Soils)
R$ 4 millions

Cultivars of non-GM maize and introgression
(Embrapa Maize and Sorghum)
R $ 11 millions

Monitoring software (leaf cutting ants)
Embrapa Monitoramento
R$ 2 milhões

Bt isolates and baculovirus for resistant GMOs
(Embrapa Maize and Sorghum)
R$ 2 millions

Integrated Platform for Precision Agriculture
Embrapa Instrumentação
R$ 5,75 milhõe

Precision Agriculture Monitoring Software
Embrapa Instrumentation
R$ 2,5 millions

Commercial Egg Disinfection Machine and robots for cleaning silos- Increased longevity of commercial eggs
(Embrapa Suinos e Aves)
R$ 600 mil

Embrapa

"Structuring actions and innovation to strengthen the productive aquaculture chains in Brazil“

EMBRAPA proposal for the strengthening of the policy of productive development of aquaculture in Brazil presented to BNDES - Funtec

Amount approved by BNDES - R $ 45 million
Total project- R $ 57 million

2016-2020

Embrapa

Phase 1 - R $ 33,690,000
Phase 2 - R $ 30 million

The Amazon Fund through the National Bank for Economic and Social Development (BNDES) for the conservation and sustainable use of the biome

70%
Technology transfer

Embrapa

2016-2022

UNIDADE EMBRAPII
Empresa Brasileira de Pesquisa e Inovação Industrial
Competência Tecnológica
BIOQUÍMICA DE RENOVÁVEIS

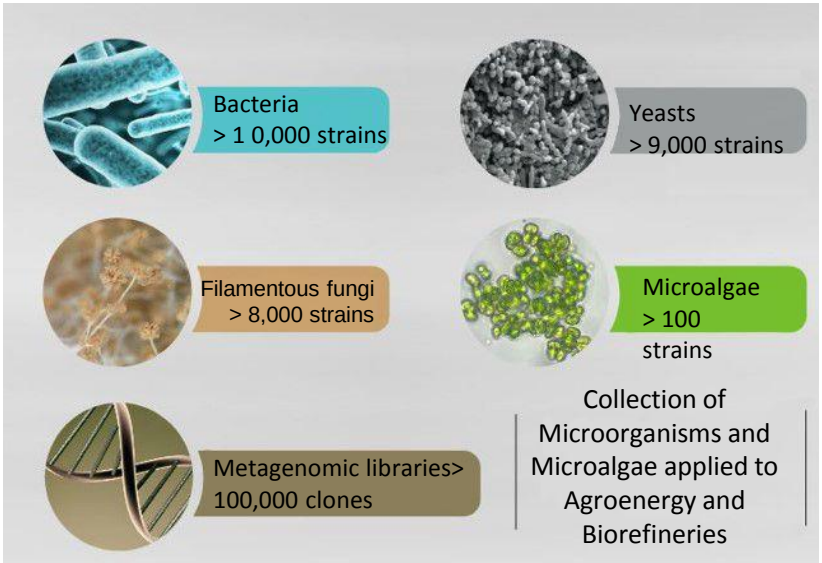
Brazilian Agency for Industrial Research and Innovation

Embrapa

Embrapa Agroenergy was selected in 2016 to be an EMBRAPII Unit with the objective of carrying out innovation projects with the private initiative in the area of Biochemistry of Renewables. The new unit will act directly in the development of technologies for the transformation of biomass into a sustainable generation of bio-energy, biomaterials and renewable chemicals.

1. *Microorganisms for the production of biofuels and energy generation*
2. *Microorganisms for the production of renewable chemicals and biomaterials*
3. *Enzymes of microbial origin for industrial use*
4. *Microorganisms for remediation and adding value to waste and agro-industrial by-products*
5. *Enzymes produced by genetically modified microorganisms (GM)*
6. *Enzymatic processes for the transformation of biomass and its derivatives*

Technological Assets



OPEN INNOVATION - BAYER

Current-

3 Projects under execution (soybean diseases and polinizators- bees)

Budget- R$ 12 million

New proposals

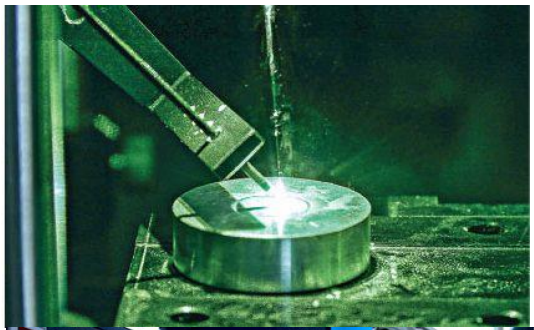
2017/2018- Other 5 proposals under evaluation

Embrapa

BAYER 120 ANOS NO BRASIL Se é Bayer, é bom

CEAT CENTRO DE EXPERTISE EM AGRICULTURA TROPICAL

Precision Agriculture



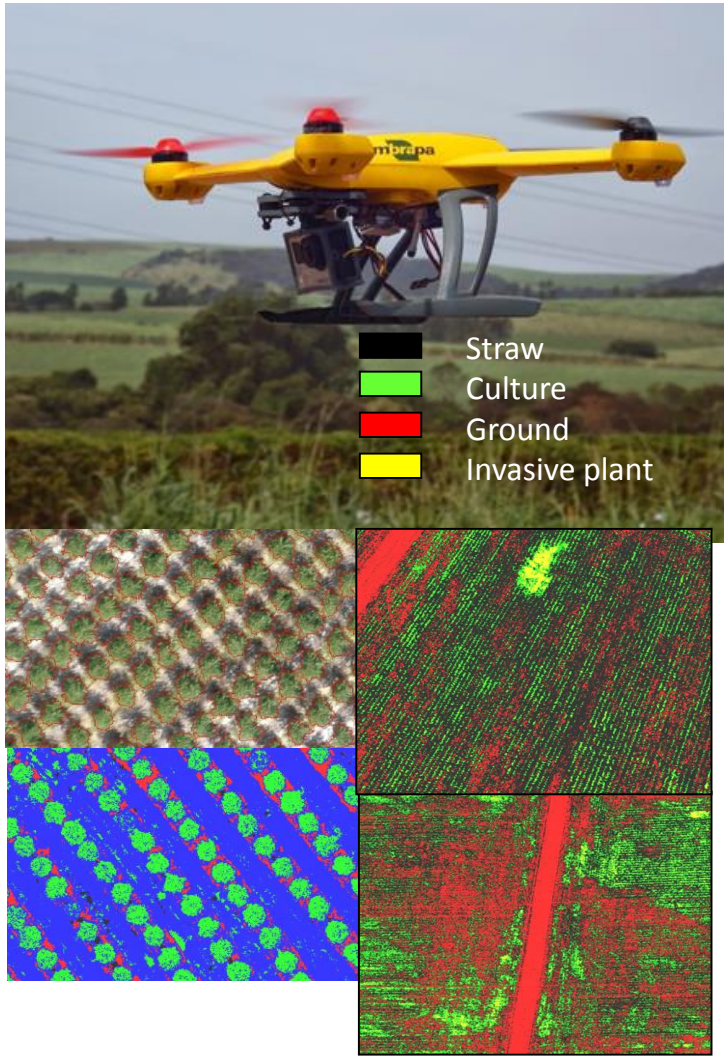
Embrapa/USP

The embedded technology in the Brazilian robot is the same as that employed in NASA Curiosity (robotic jeep), led to Mars to discover if there was water on that planet.

Laser-Induced Breakdown Spectroscopy (LIBS):

the technique is to launch a strong laser pulse on a sample to analyze what it is composed.

DRONES for Crops Monitoring



Embrapa and Qualcomm

In São Carlos, São Paulo, **Embrapa and Qualcomm**, an american processor manufacturer, will invest R $ 2 million in a research laboratory on the use of drones in crops, announced in June, to create equipment costing up to US$ 1,500 (Plan to have a **joint laboratory** in Brazil, agricultural applications)

Source: Magazine Exame 01/09/2016

Embrapa

Some Partners for Innovation of Embrapa

MOST INNOVATIVE COMPANIES 2013

127 SHARES

43_ENALTA

FOR STEPPING UP AS BRAZIL'S BIG INDUSTRY FALTERS.

READ MORE »

FAST COMPANY CONNECTION

2013

Green polyethylene (plastic biodegradable) - obtained from sugarcane

Ranking "Fast Company" in 2013: only Brazilian company among the 50 most innovative companies in the world

Braskem is a world leader in the biopolymer production capacity through its Green Polyethylene, which

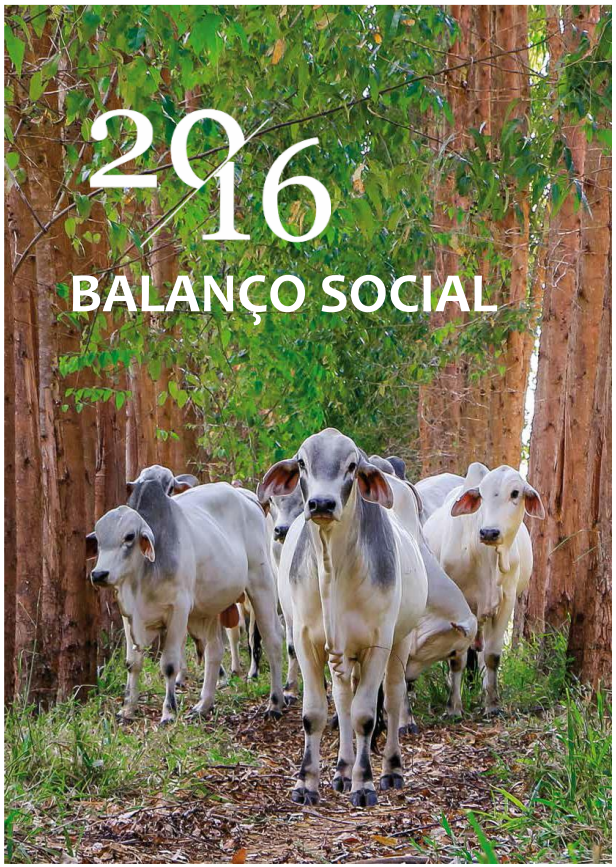
Startup company with technology developed by Embrapa

Social return

US$11,37

FOR EVERY DOLLAR INVESTED IN EMBRAPA IN 2016

RETURNED TO BRAZILIAN SOCIETY: TECHNOLOGY, KNOWLEDGE, JOBS.

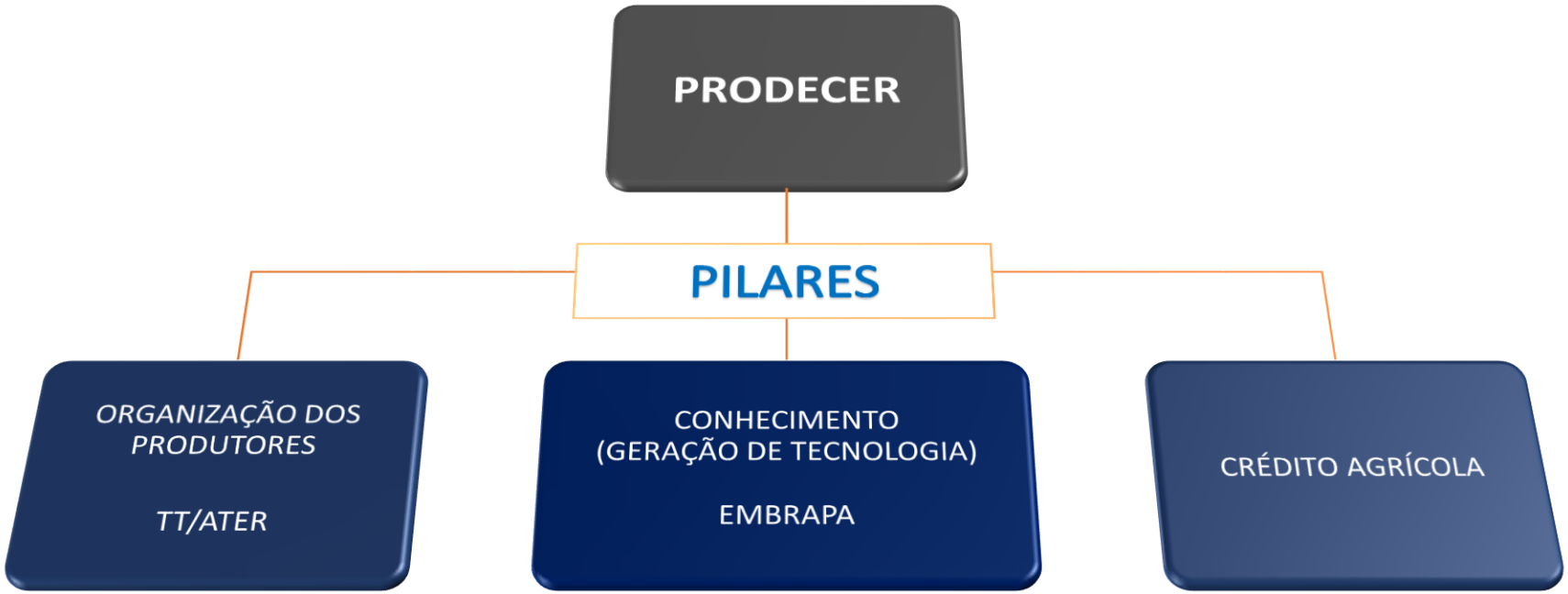


Embrapa offers to the country in 2016, a **social profit of US$ 34,88 billion.**

Based in 117 technologies and 220 cultivars.

20º year Social Balance of Embrapa

Japan and Brazil Cooperation Program for the Development of Cerrados- Signed September 1974 (Embrapa was created in April 1973)



The insertion of the Cerrados into the agricultural production process was born and grew with the partneship Embrapa-Prodecer

Technical-scientific cooperation JICA/Embrapa Cerrados, whithin the framework of Prodecer

Naruhito Japan Crown Prince
(visit to Embrapa Cerrado – Planaltina- DF - 1982)

Administrative Coordinator Prodecer 1978-1981

Masato died in 1981, and he asked to his mortal remains (ash) to be deposited close to Ipê tree (yellow) in Embrapa Cerrados

Visit of Relatives of Dr. Masato Kobayashi to Embrapa Cerrados (2013)

Akishino Japan Crown Prince
(visit to Embrapa Cerrado – Planaltina- DF- 2016)

Brazil's agricultural miracle
How to feed the world

The Economist, August 28th 2010

"…But the availability of farmland is in fact only a secondary reason for the extraordinary growth in Brazilian agriculture. If you want the primary reason in three words, they are Embrapa, Embrapa, Embrapa."

Thank you very much!

ladislau.martin@embrapa.br
www.embrapa.br