



14th Meeting of COMSATS Coordinating Council,

Bogotá, Colombia (26th – 27th May 2011)

Eduardo Campello

(Embrapa Agrobiologia)

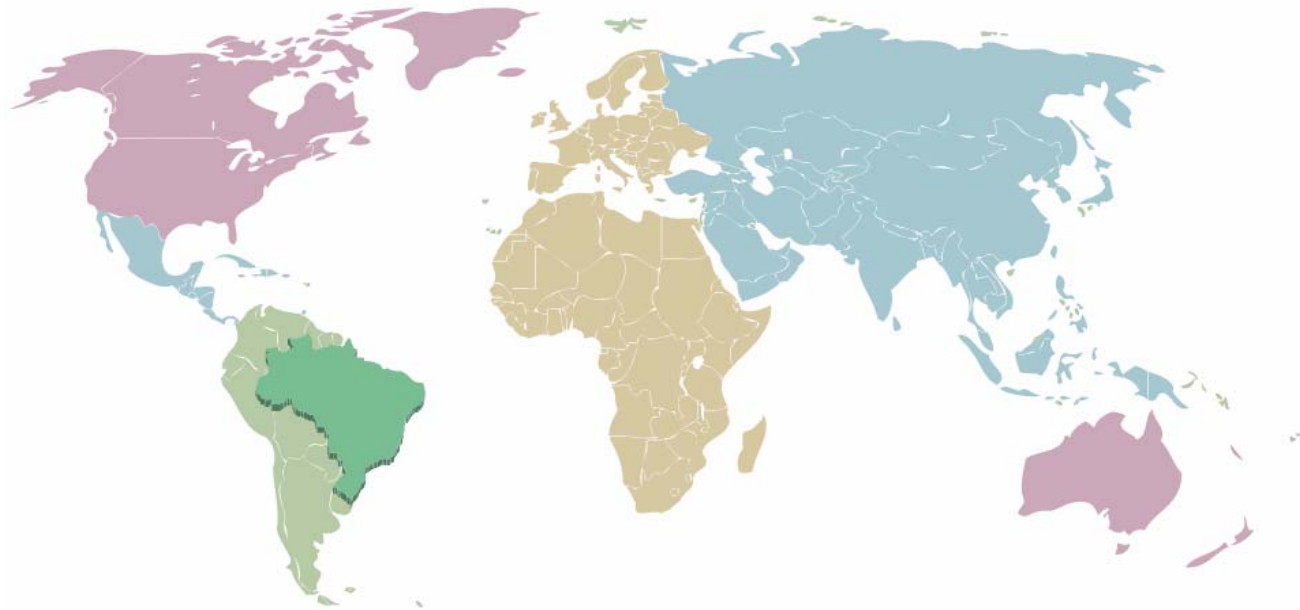


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Brazil's Profile



- Area: 8,514,000 km² (5th largest)
- Population: 191.3 million (5th biggest population)
- GDP: US\$ 1.6 trillion (8th biggest economy)
- *Per capita* income: US\$ 8 thousand
- 2009 exports: US\$159 billion
- 2009 imports: US\$136 billion



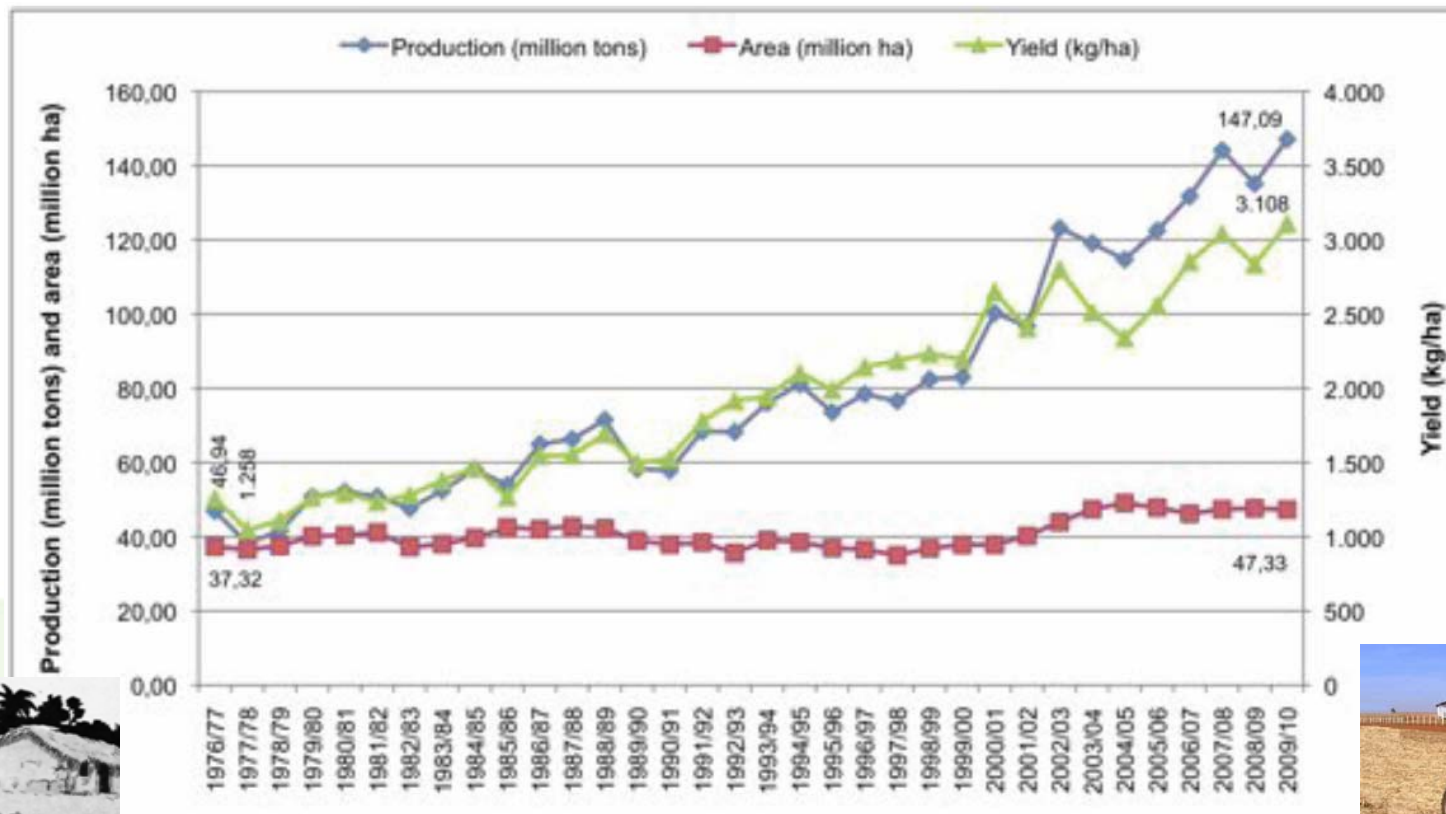
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Evolution of Agriculture in Brazil

Evolution of grain and oilseed production (million metric tons), yields (Kg/ha) and farmed area (million hectares) in Brazil from 1975 to 2010.



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2009 Ranking: Brazilian Production and Exports

Main Products	Production	Exports	Number of Markets	Exports US\$ Billion
Sugar	1 st	1 st	124	8.378
Coffee	1 st	1 st	81	3.762
Orange Juice	1 st	1 st	75	1.619
Soybean	2 nd	2 nd	46	11.413
Beef	2 nd	1 st	142	4.118
Tobacco	2 nd	1 st	100	2.992
Ethanol	2 nd	1 st	48	1.338
Broiler	3 rd	1 st	146	5.307
Corn	4 th	3 rd	49	1.259
Pork	4 th	4 th	81	1.225

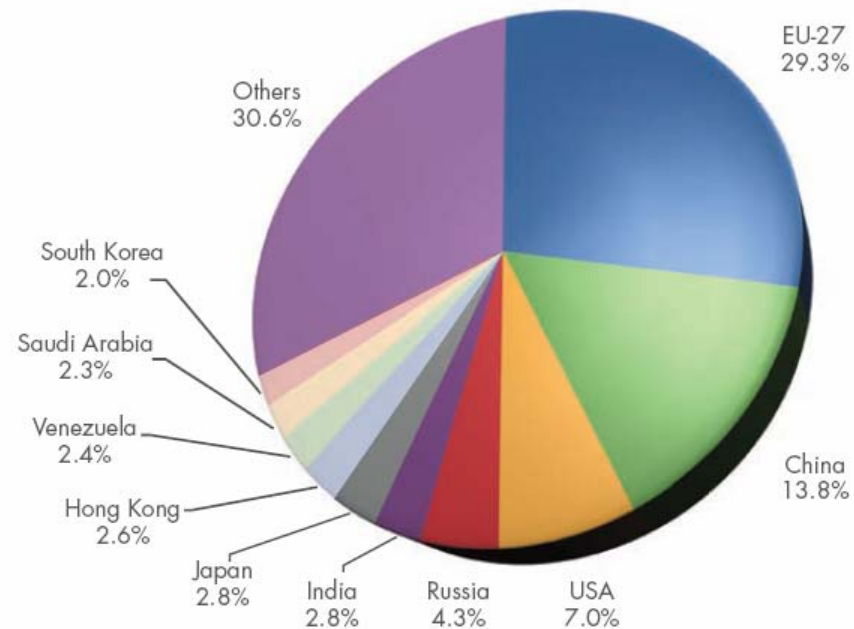
Sources: USDA, Ministry of Agriculture



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Brazilian Agribusiness Exports Main Destinations



Total: US\$ 64.8 billion

Source: Ministry of Development, Industry and Foreign Trade – 2009
Elaboration: Ministry of Agriculture



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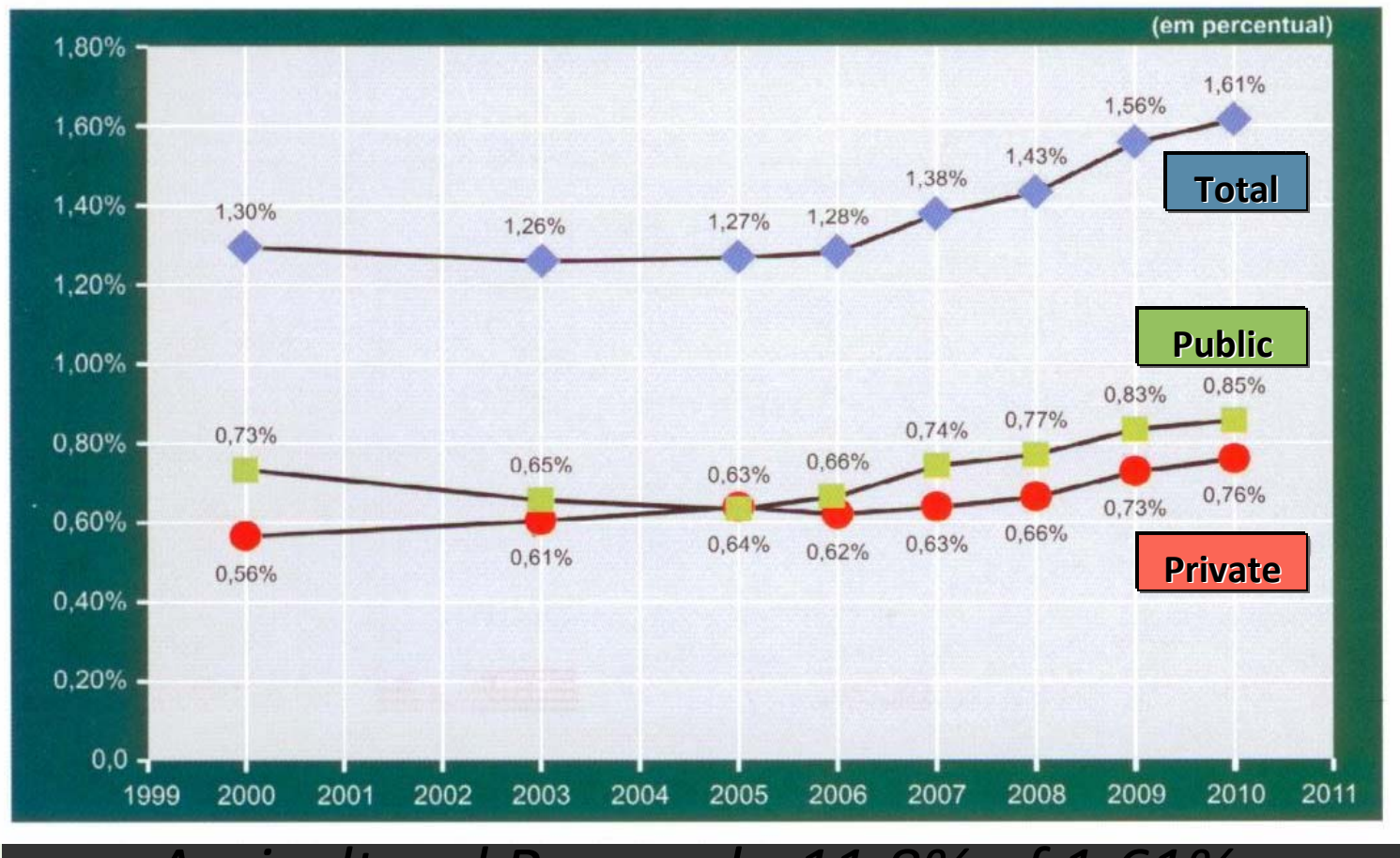
Leadership in Tropical Agriculture Technology

- Continuous & persistent public and private investments on R&D;
- Opened partnerships with other countries;
- Expressive results on productivity;
- Efficient use of natural resources.



Investment in S&T in Brazil

Investment in S&T X total GDP



Agricultural Research: 11.8% of 1.61%



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Embrapa – General Information

The Brazilian Agricultural Research Corporation

A Network of 46 Research Centers

Established in 1973

Employees: 9,284

Total Scientists: 2,253

PhD/DSc: 1,941

Budget: US\$ 1 billion

Research Centers

National Thematic

National Product

Ecorregional/Agroforestry

Services



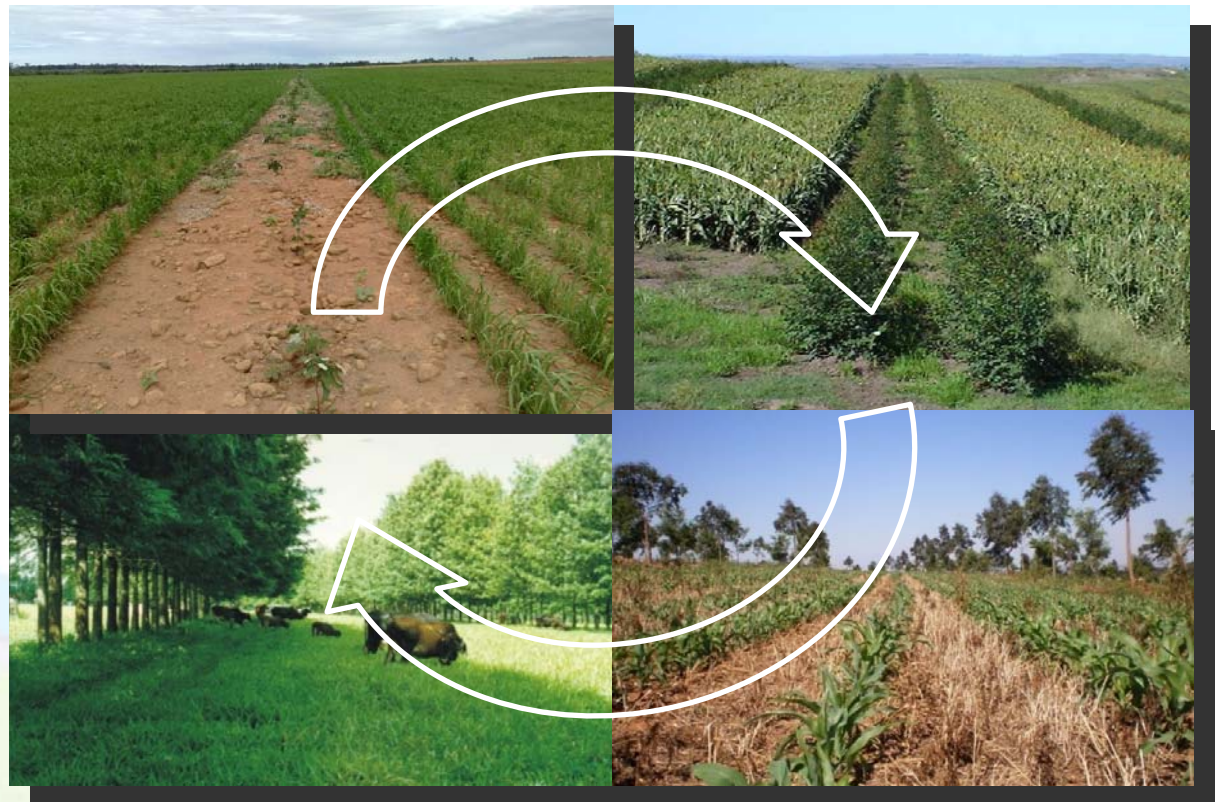
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Crop-Livestock-Forest Integration

CLFi

“Agricultural intensification and expansion with mitigation of environmental impact”



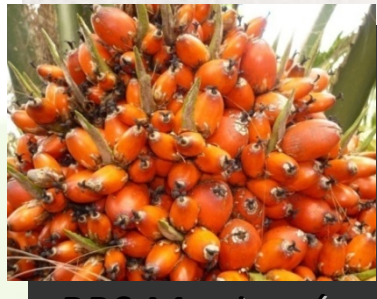
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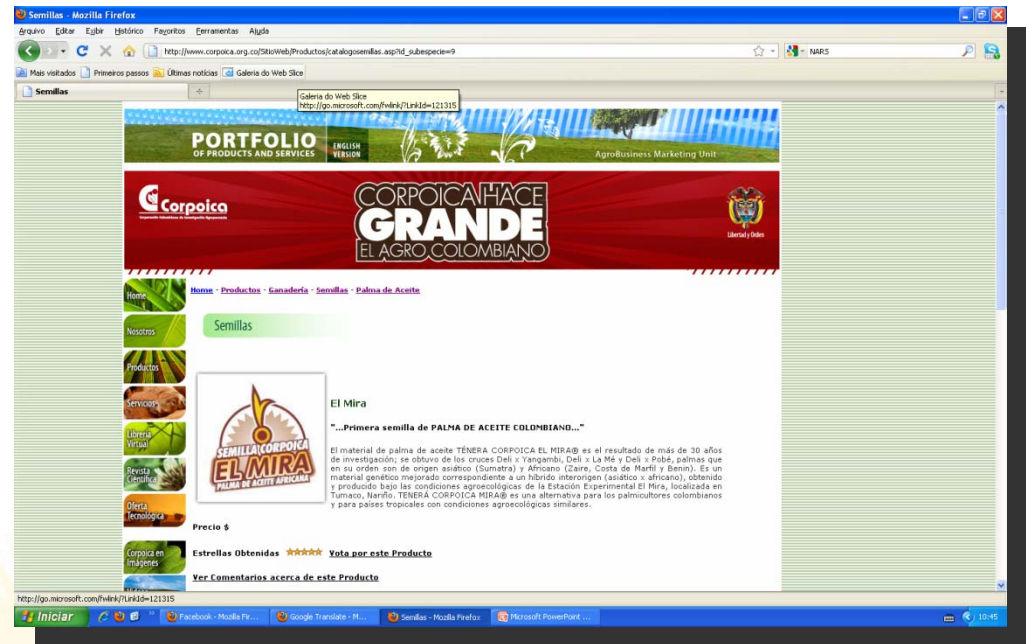
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Common interest Corpoica / Embrapa, an example

Oil Palm Sustainable Production Program



BRS Manicoré



Agroecological zoning for sustainable production

Restrict production expansion to areas that have been deforested

Prohibit the felling of native vegetation

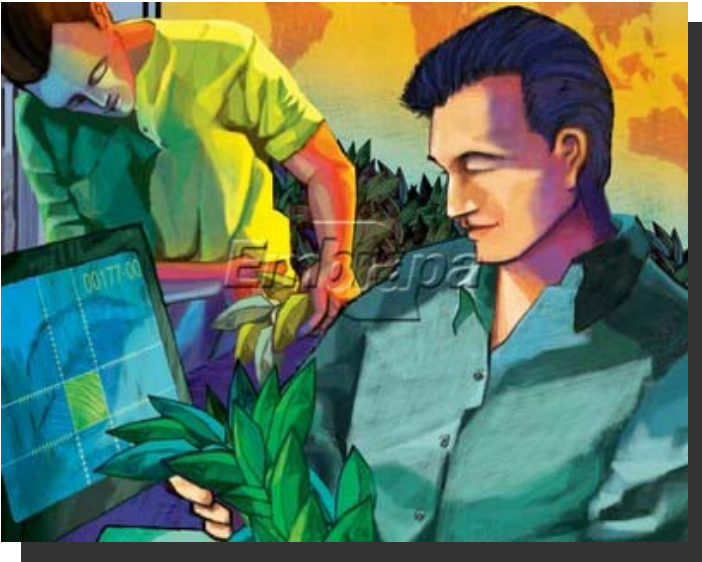
Direct the expansion of production to the recovery of degraded areas



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International Cooperation



Scientific Cooperation
Technical Cooperation
Business

Contact us: Secretariat for International Affairs
chefia.sri@embrapa.br



Scientific Cooperation Open to New Partnerships

Labex

Bilateral Cooperation

Multilateral Agreements



- Virtual laboratories
- Projects abroad



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Embrapa Agrobiology's Mission

“To generate knowledge, technologies and innovation supported by agrobiological processes in benefit of a sustainable agriculture for the society”

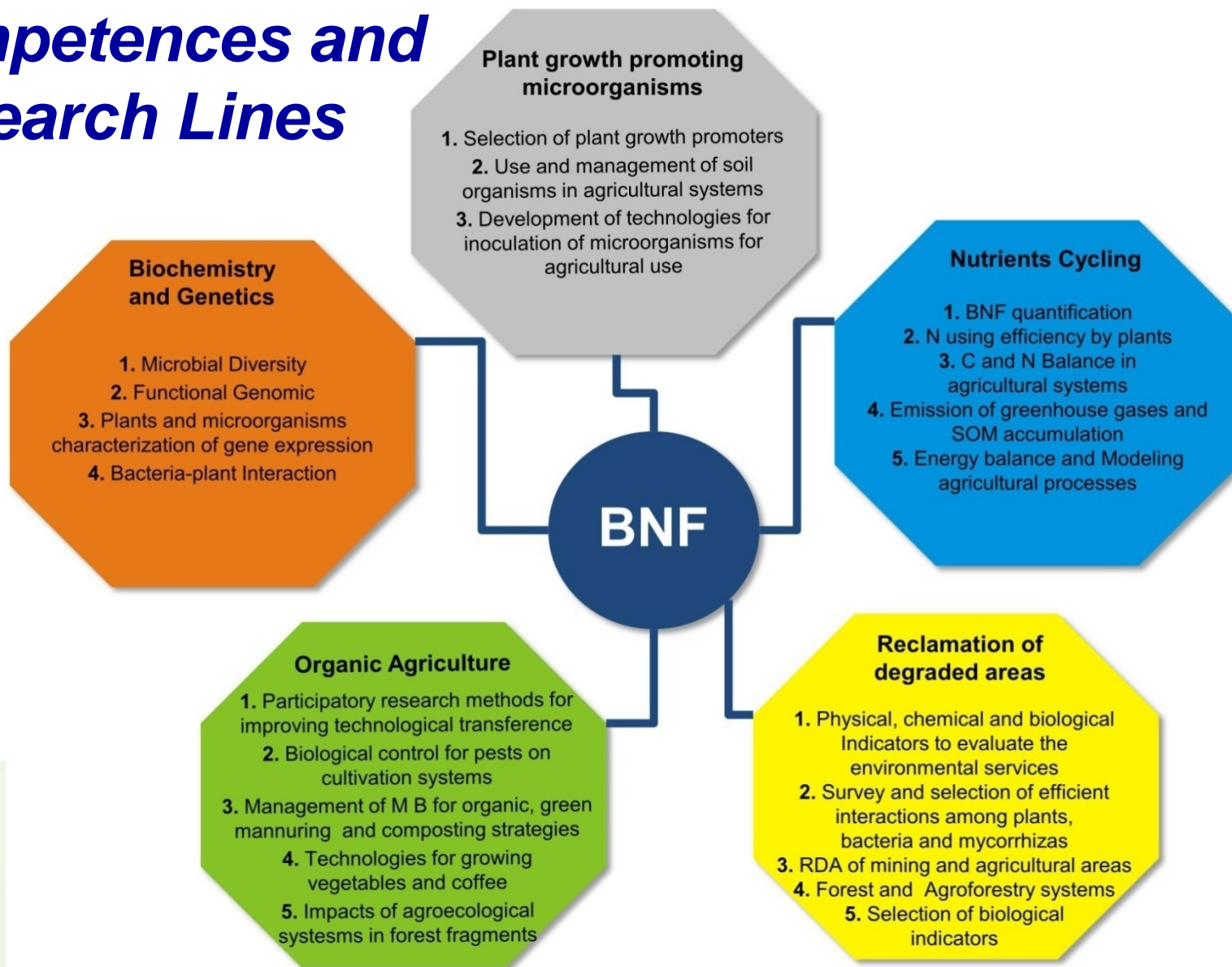


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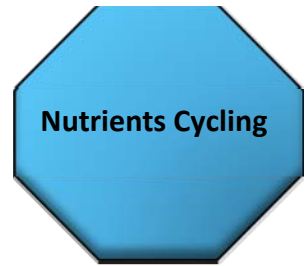
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Competences and Research Lines



Research activities by EMBRAPA on greenhouse gas emissions of Brazilian agriculture



- Changes in soil organic carbon stocks
- Methane emissions in rice fields
- Enteric methane emission by cattle
- **N₂O emissions from agricultural soils**



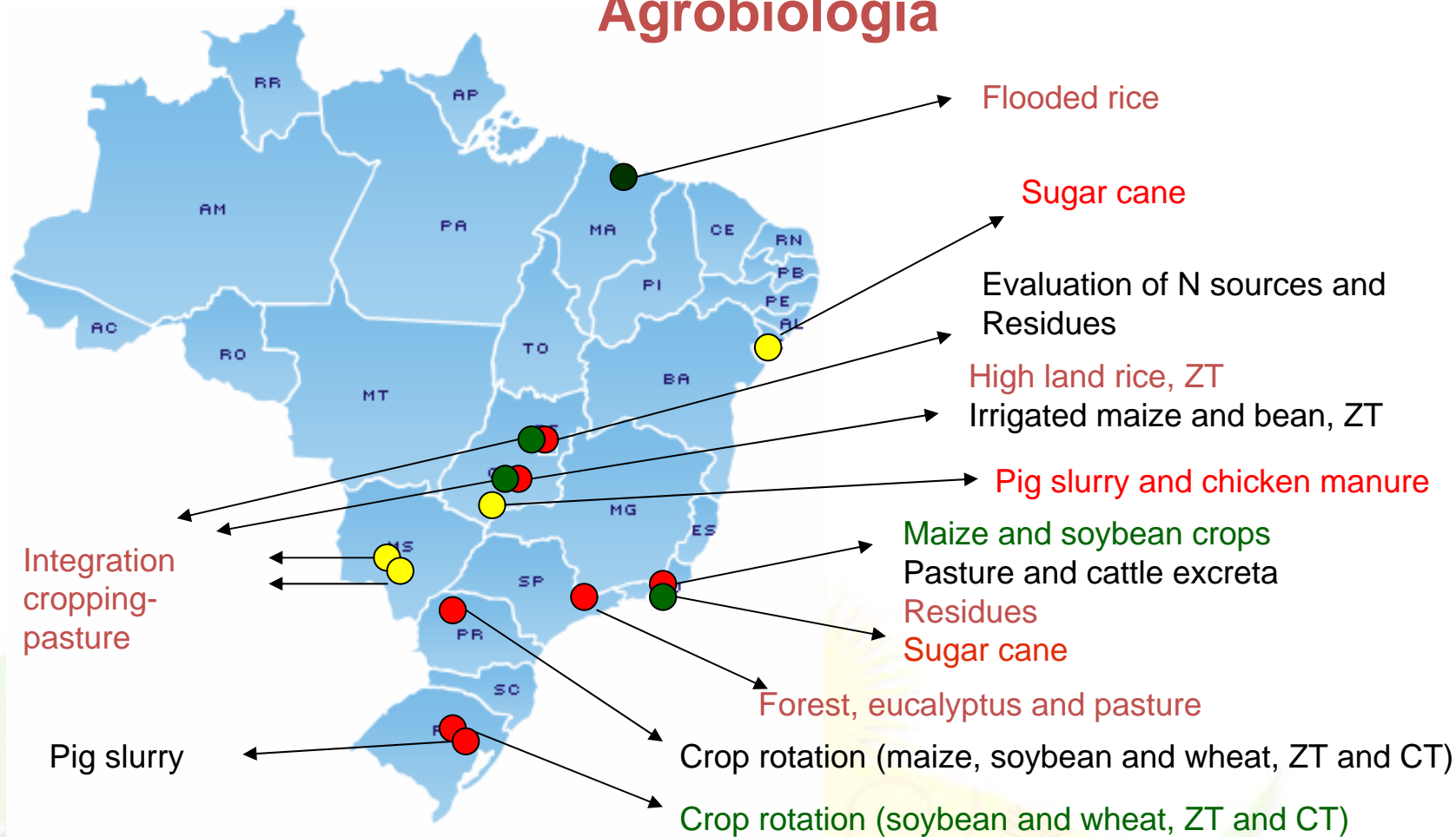
Special interest on improving soil fertility, mitigation practices of GHG emissions, and to develop emission factors for the IPCC guidelines for the National GHG inventory



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Survey of N₂O emission rate from Brazilian agriculture: Studies in development and programmed by Embrapa Agrobiologia



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N₂O emissions derived from cattle excreta in pastures

IPCC: 2% of N-excreta is lost as N₂O

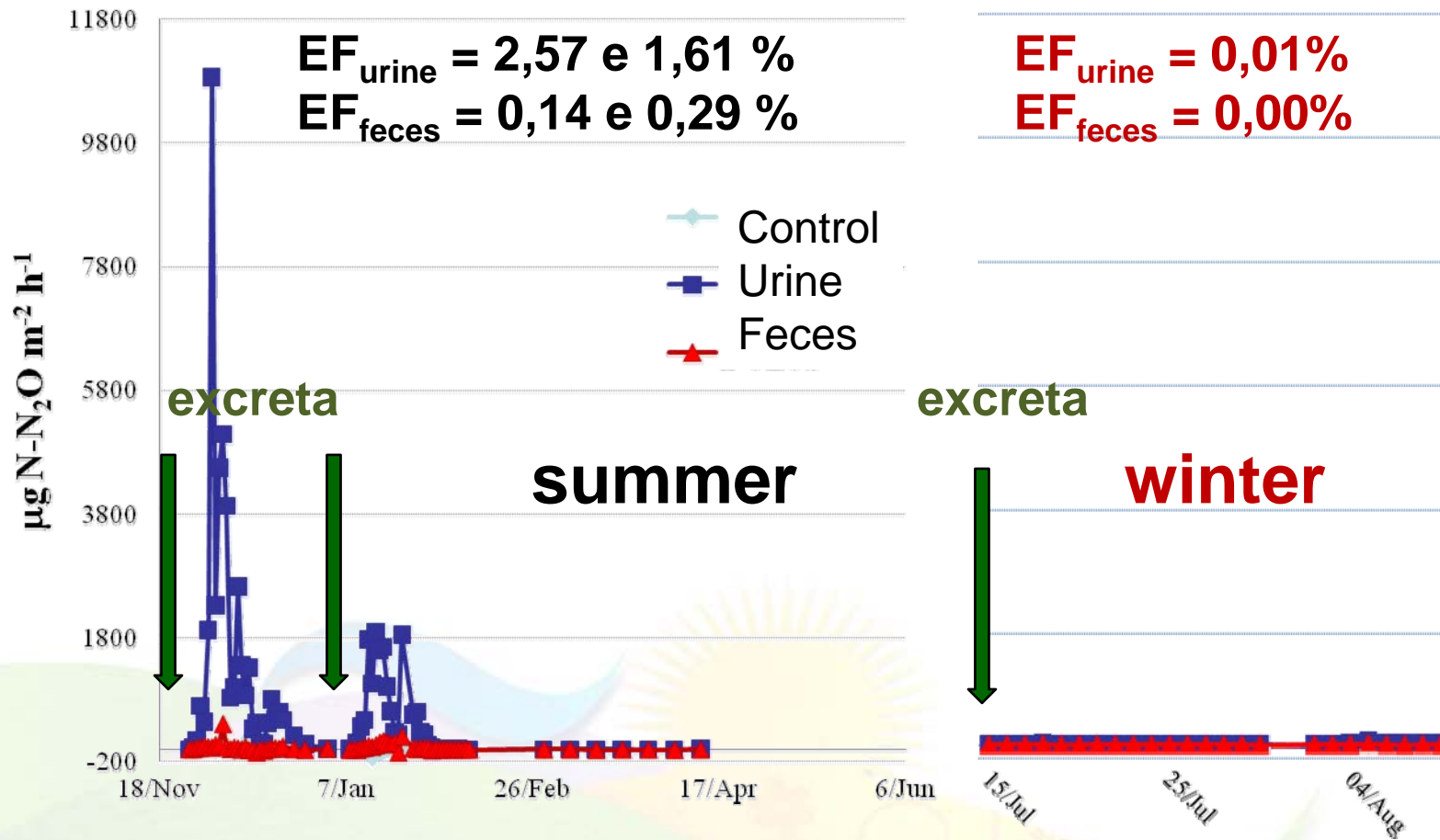


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N₂O derived from cattle urine in *Brachiaria brizantha* Marandu pasture at Santo Antonio farm, Goiás, Brazil. 2009-2010.

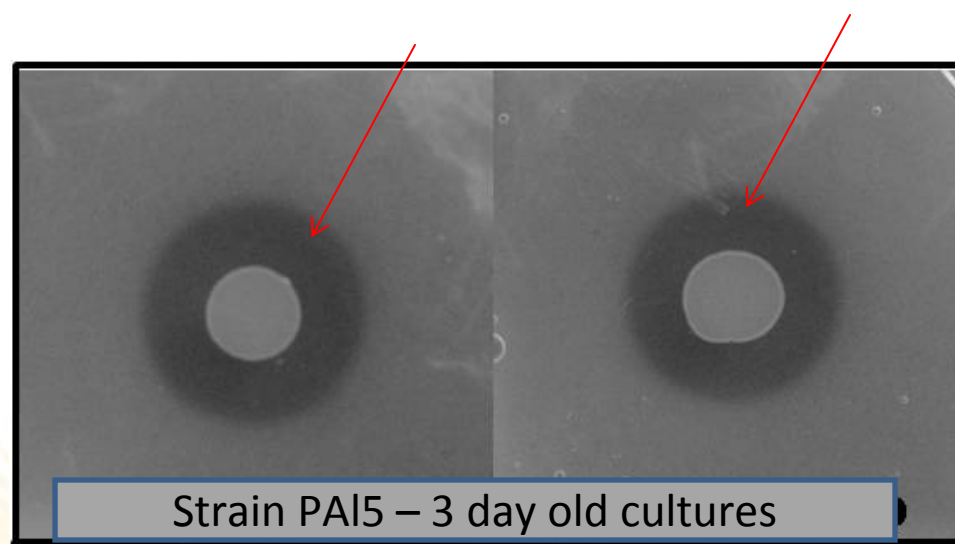
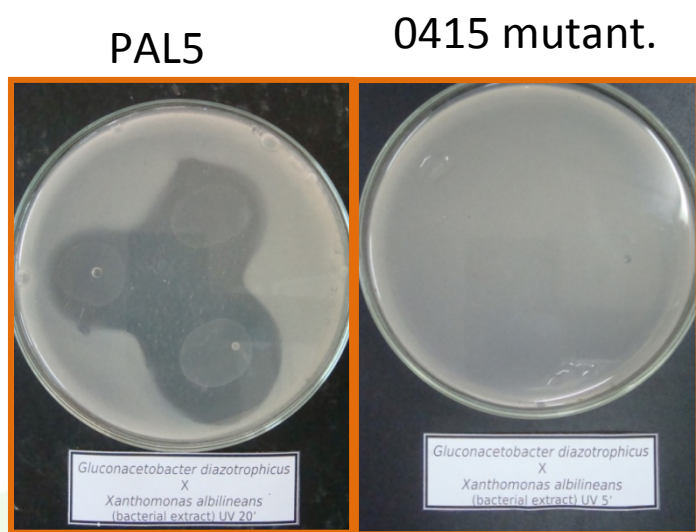


(Lessa, Madari, Urquiaga, Boddey e Alves - in preparation)



Bacteriocin production and Phosphate solubilization in *Gluconacetobacter diazotrophicus* PAL5 strain

Biochemistry and Genetics



Antagonism of wild type and mutant of *G. diazotrophicus* against *X. albilineans*.

Phosphate solubilization – in vitro assay

Galvão et al, 2010

Drechsel et al, 2010

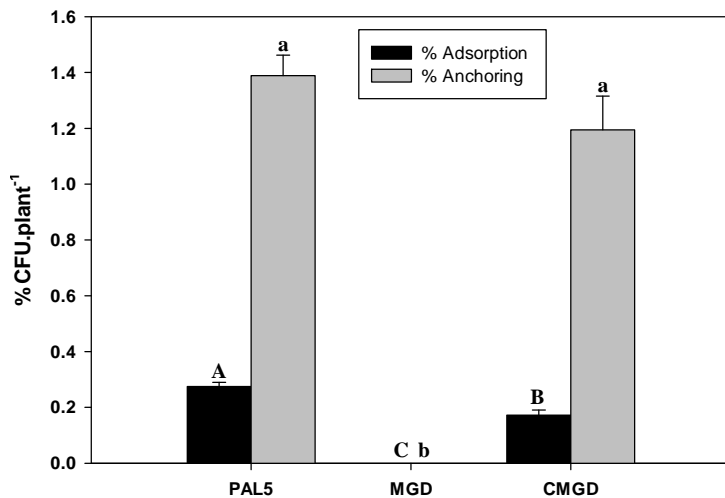


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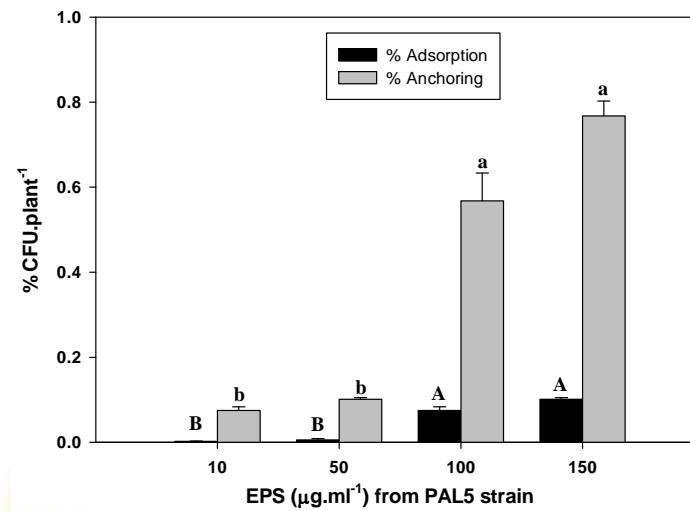


Functional genomic analysis of the endophytic diazotrophic *Gluconacetobacter diazotrophicus* strain PAL5

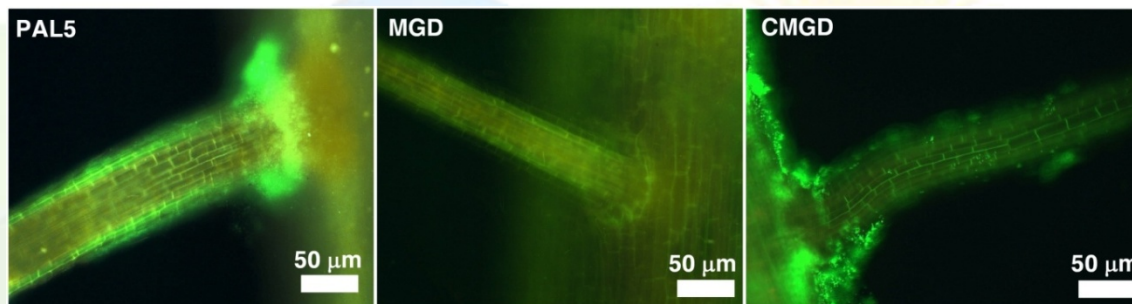
1. Exopolysaccharide (*gumD*) gene is involved in the initial steps of root colonization



Adsorption and anchoring colonization phases of *G. diazotrophicus* strain PAL5, mutant MGD and restored strain in roots of rice seedlings



Effect of EPS addition (from the wild-type PAL5 strain) on the colonization of rice roots by the MGD mutant of *G. diazotrophicus*



Adhesion of the rice root surface by the *gfp* labeled strains of *G. diazotrophicus* (wild-type, EPS mutant and restored strain).

Meneses et al, 2010



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Functional genomic studies: effect of *G. diazotrophicus* indol (auxin) minus strain inoculation on micropropagated sugarcane root growth



Galvão et al, 2010



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Inoculant for maize application

Plant growth
promoting
microorganisms

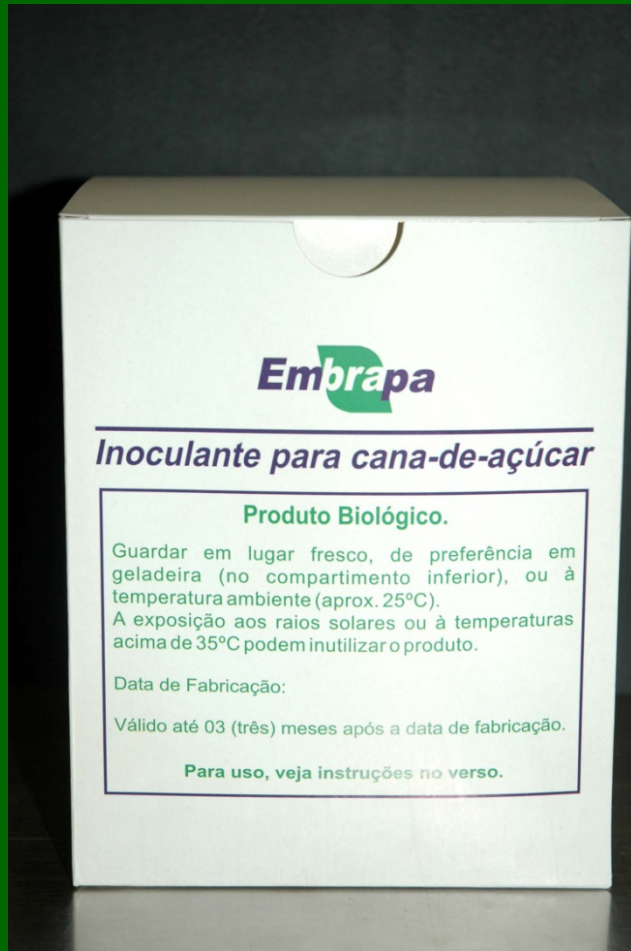
- Strain selected by Embrapa Agrobiologia
- *Herbaspirillum seropedicae* BR 11417
- Tested in four different places in Brazil:
Embrapa Agrobiologia (RJ), Embrapa Milho e Sorgo (MG), Embrapa Cerrados (GO) and Embrapa Roraima (RO);
- Tested hybrids and varieties planted in rain season (safra) and dry season (safrinha)



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Inoculant for sugarcane



5 packs containing 1250 g of peat + bacteria = mix with clean water

Sugarcane in Brazil 2008 - 2009

Harvested area 2008 – 8.2 million ha (Mha)

- Planted area 2009 – 9.7 Mha
- **Total Cane production 2008 = 649 Million tonnes (Tg)**
- Mean yield – 79.7 tonne/ha
- **Ethanol production - 27 Billion litres (5.4 bi exported)**
- Production of ethanol per ha - 6500 litres



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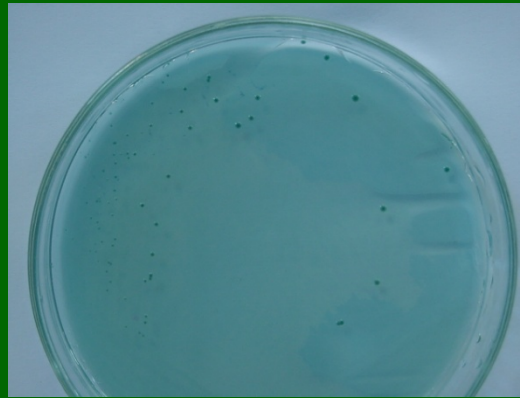


RB 52-454

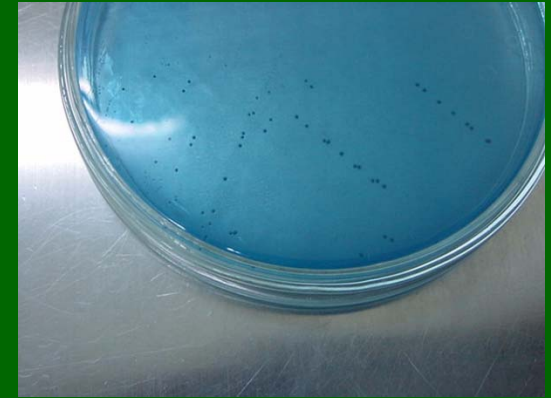
Maize



Burkholderia tropica



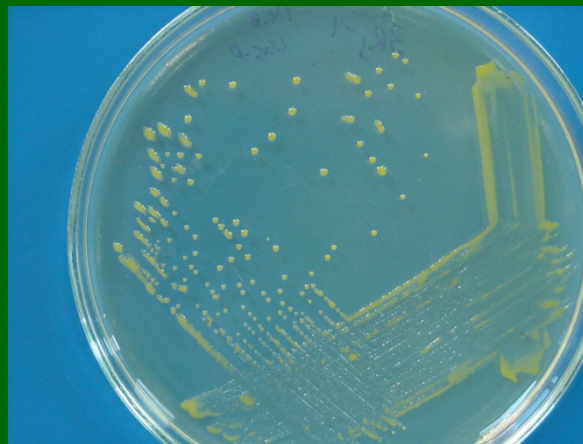
H. rubrisubalbicans



Herbaspirillum seropedicae



Azospirillum amazonense



Gluconacetobacter diazotrophicus

Bacteria used
in the inoculant



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Better growth

Increment of the root system

Contribution to N nutrition

Controle

Inoculado
Imerso
(30 min.)



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Ratoon Field inoculation





A New International Project: Inoculant for cowpea in África

- Project: Cooperation Program for Developing Agricultural at Tropical Savannah - Mozambique
 - Country: Mozambique
 - Partnership: Agriculture Research Institute of Mozambique
- Project: Africa-Brazil Agricultural Innovation Marketplace
 - Country: Ghana
 - Partnership: Savanna Agricultural Research Institute (SARI)



AGROFORESTRY SYSTEM CONNECTING FOREST FRAGMENTS

Reclamation of degraded
areas

To allow the flow of
animals and ensuring
the maintenance of
biodiversity.

© 2010 MapLink/Tele Atlas
Image © 2010 GeoEye

©2009 Google

Data das imagens: 2/Set/2009

22°45'08.62" S 43°40'28.50" O elev 27 m

Altitude do ponto de visão 487 m



AFS ESTABLISHMENT



Organic Agriculture

- **Technology for the establishment of the consortium lettuce-onion.**
- **Vegetable cultivation in Alley cropping**



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Infrastructure – laboratories (18)

- Nitrogen and Isotopes (^{15}N e ^{13}C)
- Soil-Multi-user
- Organic Agriculture
- Organic matter
- Enzymes
- Biological control
- Soil fauna
- BNF Leguminous Trees
- Collection of cultures
- Microbial Ecology
- Microscopy
- Micorrizas
- BNF Grasses
- Genetics/Biochemistry
- Genome
- Molecular Techniques – Multi-user
- Inoculant Development
- Inoculant Production



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Embrapa Agrobiology Staff



Total: 148 employees

- 40 researchers (most of all PhDs)
- 35 analysts (graduated)
- 73 support



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Thank you!