The Brazilian Agricultural Research for Development System
Past Achievements, Challenges and Opportunities for the Future

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The Brazilian Agricultural Research for Development System
Past Achievements, Challenges and Opportunities for the Future

Brazilian Agriculture
Agricultural Research for Development System - ARD
The Brazilian Agricultural Research Corporation – Embrapa

International Cooperation
Challenges and Opportunities
There is a Brazil that most people know

Amazon forest  Soccer  Carnival  Coffee

It keeps being successful, but there is still more to know
The Brazil you must know

Technology, Innovation, Competitiveness

A strong academic base
10,000 doctors trained every year
> 16,000 scientific papers
A growing intensity of industry R&D
The Brazil you must know

The Economist - Nov. 14-20, 2009
“A country with the world’s largest freshwater supplies, the largest tropical forests, fertile land that in some places allows up to three harvests a year, and huge mineral and hydrocarbon wealth.”

The Atlas of Ideas – Demos Institute, 2008
“It is helpful to think of Brazil as a ‘natural knowledge-economy’... its innovation system is in large part built upon its natural and environmental resources, endowments and assets.”
“Brazil: the natural knowledge economy”

2/3 of biodiversity concentrated in the tropics

37% in tropical America

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Brazilian Biomes: a rich natural resource base

Brazil has a total area of 850 million ha, most of it dedicated to conservation.

The country has 388 million ha of highly productive arable land, 90 million of which have yet to be farmed.
“Brazil: the natural knowledge economy”

Agribusiness in Brazil is driven by innovation
The Brazilian Agricultural Research System

17 State Research Networks
OEPAS

40 Embrapa Centers

70 Universities

The Brazilian Agricultural Research Corporation

Brazil has also an active and growing private sector, which supplies technologies and technical assistance mainly in farm inputs and food processing.
The Brazilian Agricultural Research System

Brazilian Agriculture
From the 50’s to the 90’s

Source: MAPA, 2002
The Brazilian Agricultural Research System

**Tropical soybeans**

Technological evolution and crop expansion in Brazil

1960

1975

1999

Adapted varieties

Biological nitrogen fixation

Minimum tillage - mechanization
The Brazilian Agricultural Research System
The Brazilian Agricultural Research System

**Exports**
In 2008 Brazil exported more than 1500 types of agricultural products to foreign markets

**Commercial partners**
Around 79% of the Brazilian food production is consumed domestically and 21% is shipped to over 212 foreign markets

<table>
<thead>
<tr>
<th>Product</th>
<th>Production</th>
<th>Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>1st</td>
<td>1st</td>
</tr>
<tr>
<td>Orange juice</td>
<td>1st</td>
<td>1st</td>
</tr>
<tr>
<td>Coffee</td>
<td>1st</td>
<td>1st</td>
</tr>
<tr>
<td>Beef</td>
<td>2nd</td>
<td>1st</td>
</tr>
<tr>
<td>Soybean</td>
<td>2nd</td>
<td>1st</td>
</tr>
<tr>
<td>Tobacco</td>
<td>3rd</td>
<td>1st</td>
</tr>
<tr>
<td>Broiler</td>
<td>3rd</td>
<td>2nd</td>
</tr>
<tr>
<td>Corn</td>
<td>3rd</td>
<td>4th</td>
</tr>
</tbody>
</table>

Source: SPA/MAPA (Agricultura Brasileira em Números)
The Brazilian Agricultural Research System

Sugarcane Etanol as Energy Source in Brazil

`Gasoline is Becoming the Alternative Fuel in Brazil`

Source: ANP, 2009 and Brito Cruz, 2009
The Brazilian Agricultural Research Corporation – Embrapa, is the largest component of the Brazilian ARD System.

**Embrapa Network for R,D&I**

- 41 Research Centers and Services Units
- 3 Virtual Laboratories Abroad (Labex)
- Offices for Technology Transfer: 14 in Brazil and 2 abroad (Africa and Venezuela)

- **North**
  - Embrapa Acaraí
  - Embrapa Amapa
  - Embrapa Western Amazon
  - Embrapa Eastern Amazon
  - Embrapa Rondônia
  - Embrapa Roraima

- **Northeast**
  - Embrapa Mid-North
  - Embrapa Tropical Semi-Arid
  - Embrapa Coastal Tablelands
  - Embrapa Goat and Sheep
  - Embrapa Cassava & Tropical Fruits
  - Embrapa Cotton
  - Embrapa Tropical Agromedicine

- **Mid-West**
  - Embrapa Agroenergia
  - Embrapa Western Region Agriculture and Livestock
  - Embrapa Rice & Beans
  - Embrapa Coffee
  - Embrapa Cerrados
  - Embrapa Beef Cattle
  - Embrapa Vegetables
  - Embrapa Technological Information
  - Embrapa Pantanal
  - Embrapa Genetic Resources & Biotechnology
  - Embrapa Technology Transfer

- **South**
  - Embrapa Temperate Agriculture
  - Embrapa Forestry
  - Embrapa South Animal Husbandry & Sheep
  - Embrapa Soybean
  - Embrapa Swine and Poultry
  - Embrapa Wheat
  - Embrapa Grape & Wine

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2,500 Researchers
6,500 Staff
+ 1,200 new hirings (2013)

2009 Budget: US$ 1 Billion
The Brazilian Agricultural Research Corporation

Commodity Centers

Thematic Centers

Eco-regional Centers
The Brazilian Agricultural Research Corporation

Strong emphasis in perfecting its strategy to shape research programs to meet the demands of the users

- Competitiveness
- Renewable Energy
- Natural Resources
- Agrobiodiversity Conservation and Use
- Frontier Programs
The Brazilian Agricultural Research Corporation

Emphasis in the continuum R&D – Technology Transfer - Communication
Quality to Science - an internal competitive system strongly sustained in peer review.
R&D & TT strategies that promote networking and strong links with the private sector.
The Brazilian Agricultural Research Corporation

Links with the private sector to quickly bring innovations to the market

**Example:** More than 10 years of successful cooperation between Embrapa and BASF allowed the development of Cultivance® the first genetically modified crop developed in Brazil, from laboratory to commercialization.

http://www.basf.com/group/pressrelease/P-10-148
Contributions of Embrapa

- Advanced Production Systems
- Agroindustry
- Environment
- Regional Development
A comprehensive portfolio to meet the needs of the users

**Products**
- Varieties
- Hybrids
- Animal clones
- Germplasm
- Bioinsecticides
- GMOs
- Agricultural Machinery
- Equipaments
- Kits for diagnostics
- Vaccines

**Processes**
- Crop Management Systems
- Crop Adaptation Processes
- Food Processing Methodology
- Plant & Animal Transformation
- Gene Prospection Methodology
- Integrated Pest Management
- Fingerprinting
- Agroecological Zoning
- Traceability & Certification

**Information**
- Cultivar Evaluation Networks
- Traceability and Certification
- Forecasting and Future Analysis
- Biological Security Networks
- Genomics and Biological Functions
- System's Automation
- Monitoring – IPM
- Monitoring – Environmental Quality
- Monitoring – Food Chains
- GMOs & Biosafety

**Services**
- Germplasm Exchange
- Quarantine Analysis
- Information Networks
- Franchising
- Quality Control
- Consultancy
- Training
- Business Incubation
Embrapa’s Share in Crop Variety Protection in Brazil (em %)

(August 2005)

Total protected cultivars: 699
The Brazilian Agricultural Research Corporation

Embrapa publishes regularly its social balance

Every Brazilian Real (R$) invested in Embrapa returns between R$ 12 and R$14 to the Brazilian society (US$ 1.00 = R$ 1.77).

The Social balance of Embrapa in the past 10 years amounts to US$ 49.7 billion

http://bs.sede.embrapa.br/2006/
International Cooperation is Key to Embrapa

Our Belief

As the world becomes more interconnected and challenges become more complex, it will be increasingly necessary to work through intense cooperation.

President Lula: “The Internationalization of Embrapa is a State Policy”

September 11, 2009 · Leave a Comment

The Brazilian President Luiz Inácio Lula da Silva welcomed the new President of Embrapa during the inauguration ceremony, last July. He said that “the mark of Embrapa has always to be the technical expertise, no other” and that “Brazil is a plural country and Embrapa has to be plural and capable to attend many, as well as to increase its contribution to the world.” President Lula spoke about the expectations for the new management and one of his most emphatic remarks was that “the internationalization of Embrapa is not only a desire for the government, but a state policy, which will be a constant in the future.” Read more (in Portuguese) here.

http://labexkorea.wordpress.com/
International Cooperation is Key to Embrapa

Embrapa collaborates with the CGIAR system since its origin;

This relationship, especially at the beginning of Embrapa, was very important to set directions for research and for training scientists;

Embrapa recognizes that important shares of the Brazilian seed market of wheat, maize, beans and rice is held by varieties that were improved using genetic material received from CGIAR centers.
International Cooperation is Key to Embrapa

A strong post-graduation program sent hundreds of young professionals abroad, to the United States and Europe, and to a lesser extent to the United Kingdom, Canada, Spain, Holland, Germany and Australia.

Projects financed by the World Bank, Inter-American Development Bank and the Japanese government have been very important to finance this human development program and also to equip the research units.
International Cooperation is Key to Embrapa

The success of Brazilian tropical agriculture motivates countries with similar problems and challenges to seek information and partnership with Embrapa.

Today Embrapa has:

78 bi-lateral agreements with 89 institutions in 56 countries;

Multilateral Agreements with 20 International Organizations;

At project level, there are numerous agreements involving several countries, organizations and research networks.
Embrapa Africa

Technology transfer office in Accra, Ghana since November 2006

- 11 agreements and ongoing projects in several African Countries

- 8 agreements and projects being negotiated

International Technology Transfer Programs
Embrapa Latin America
Technology transfer office in Caracas, Venezuela, since May 2008

- 11 Agreements and ongoing projects in Latin American countries

Embrapa Americas will be soon opened in Central America - Panama
Labex – cooperation in cutting-edge agricultural R&D

Embrapa has developed more than a decade ago the concept of “Virtual Laboratories Abroad” – Labex, as means of increasing its scientific and technological ties with advanced research organizations around the world.

Labex USA
1998

Labex Europe
2002

Labex Korea
2009
The Embrapa Labex Program

“Labex Role”
To bring the international dimension to the innovation process

Monitoring trends in S&T and opportunities of cooperation

Promoting collaborative projects in strategic areas

Facilitating exchanges of scientists

Identifying training opportunities

Promoting technical meetings and scientific exchange

Follow-up on joint research projects
The Embrapa Labex Program

“The Labex Impact”
International networking - cutting-edge research - capacity building - access knowledge
access new funds and tools - increased visibility - dialogue in international fora, etc,etc...
Challenges and Opportunities

Sustainable development is one of the most challenging goals for mankind, and is vital to Brazil!
Challenges and Opportunities

Better understanding of the impacts of agricultural innovation

**Good:**
- High Performance Genetics
- Highly Specialized Production Systems
- Sustainable Growth in Productivity
- Highly Competitive Agriculture - Exports
- Generates Needed Resources for Development

**Bad:**
- Environmental Impacts
- Social Inequities
- Regional imbalances
- Pressure over fragile biomes
Challenges and Opportunities

We need a new knowledge-intensive revolution to address:

- The raising cost of energy and the need to reduce the use of petrochemical inputs in agriculture;

- The vulnerability of agricultural systems to global environmental change and to biological threats;

- The need to increase the productivity of environmental services and natural resources, and to protect fragile biomes;

- The need to promote the multi-functional roles of agriculture;

- The need to reduce the technological divide between social groups & regions;

- The growing demand for traceability and certified sustainable production …
Challenges and Opportunities

Key challenges in the next 10 to 20 years:

- To intensify research and use of advanced biology in genetic improvement;
- To pursue the development of a strong and sustainable Brazilian bio-economy;
- To develop further and intensify the use of precision farming and new tools for safety and pest monitoring and control;
- To improve and intensify the use of integrated systems (agro-animal-forest);
- To generalize the use of IT as a tool to reduce trade costs, especially by small-scale producers;
- To accelerate the integration of value chains;
- To promote sustainable overall increases in production and productivity;
Challenges and Opportunities

Institutional Timing x Speed of Changes

Global Order?

Informed & Demanding Society

Trans boundary Challenges

Social nets

Strategic Intelligence & continuous foresight

New “languages” & methods Communication

Effective approaches to networking

http://www.gcrio.org/USGCRP/forum/gifs/wheel80.gif
Challenges and Opportunities

The Changing Nature of Science
Impacts of Convergence in the Innovation System

Organizations dedicated to Science, Technology and Innovation will need to rethink their institutional structures and processes to motivate their professionals to venture across dissolving disciplinary barriers...

Leaders?

Thinkers?

Scientists?
Challenges and Opportunities

Strategic Intelligence – Out of the Gradual View of Change
Challenges and Opportunities

Strategic Intelligence – Towards a Radical View of Change

Success only to those that are able to learn and innovate in a continuous manner!
Thank You!

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http://labexkorea.wordpress.com/
www.agropolis.fr/international/labex.htm