



# The Brazilian Pipeline of GM Crops

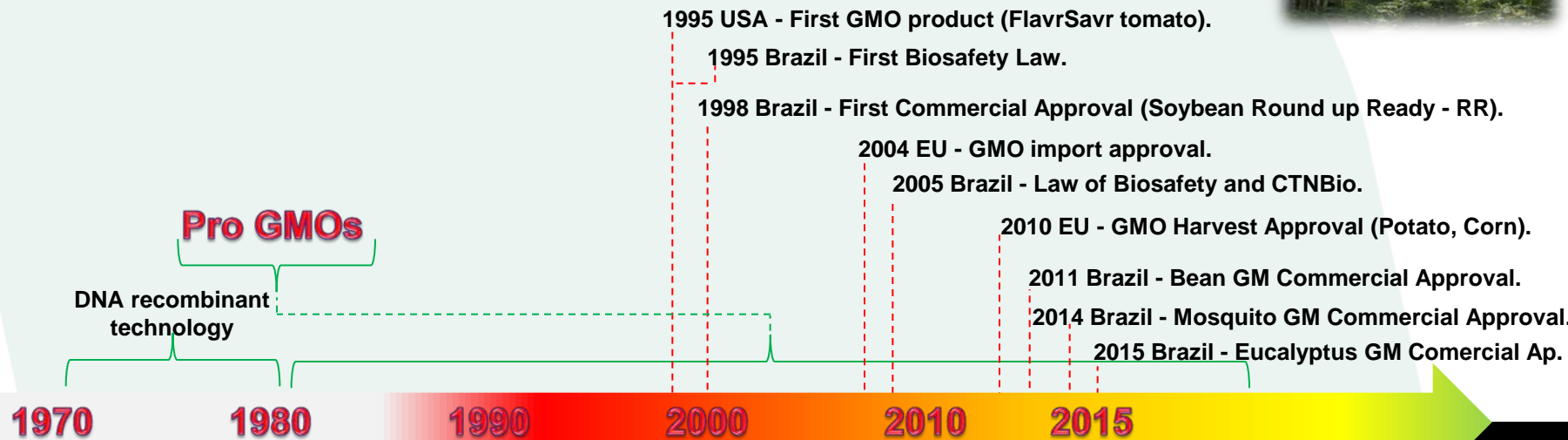
Marcelo H. A. Freitas  
Maria J. A. Sampaio



# **Brazilian Biosafety System**



# Timeline



2015 Brazil - CTNBio invasion.



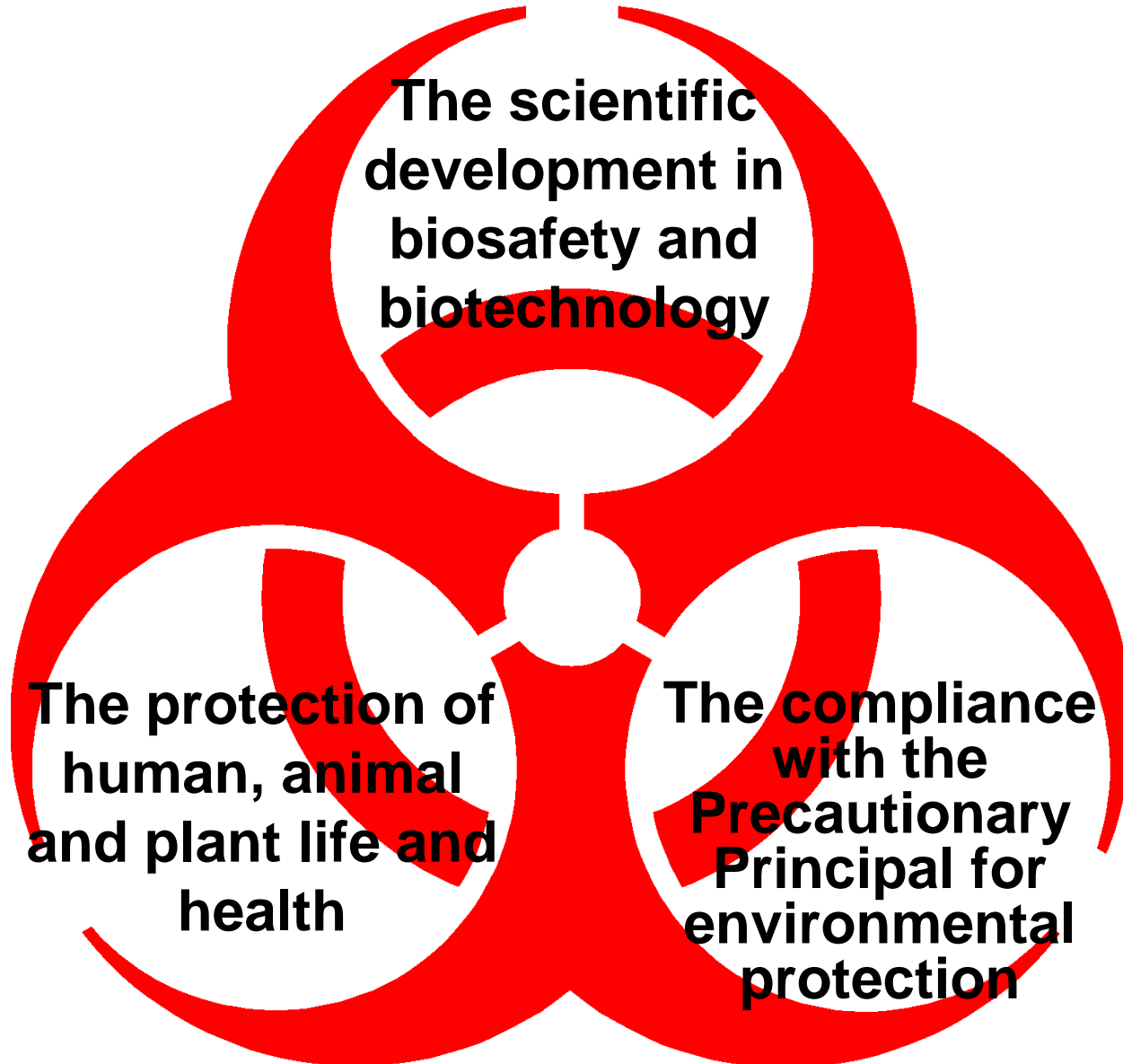
2014 Brazil - CTNBio invasion.



## Anti GMOs



# Biosafety Law Guidelines



# Brazilian Biosafety Law

Provides for safety norms and inspection mechanisms for activities with GMOs and their by-products.

Law nº 11.105, dated March 24th, 2005.

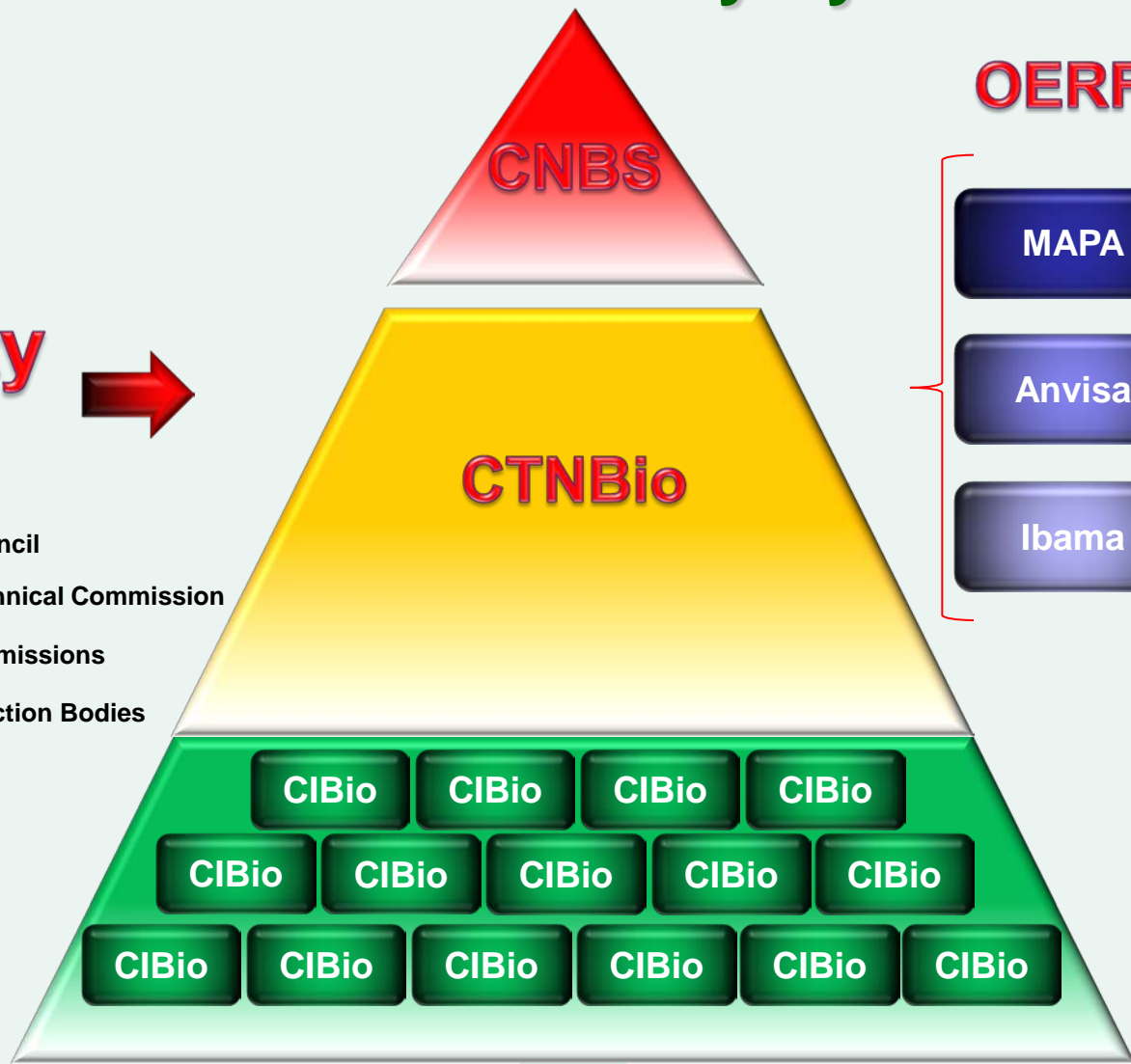
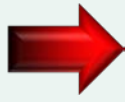
Comprehensive review of the 1995 Law.

Establishes the **National Biosafety System**.



# Brazilian Biosafety System

**Biosafety Law**



**OERFs**

**MAPA**

Agriculture

**Anvisa**

Human Health

**Ibama**

Environmental

-  National Biosafety Council
-  National Biosafety Technical Commission
-  Internal Biosafety Commissions
-  Registration and Inspection Bodies



# Brazilian Biosafety System

• Biosafety Maintenance

• Risk Assessment

**CIBio**  
Biosafety  
Internal  
Commission

**CTNBio**  
National  
Technical  
Commission

- Law 11.105/2005
- Decree 5.591/2005
- CTNBio Normatives

**OERF**  
MAPA ANVISA  
IBAMA

**CNBS**  
National  
Biosafety  
Council

• Registration and  
inspection agencies –  
specific areas

• National interest and socio  
economic factors

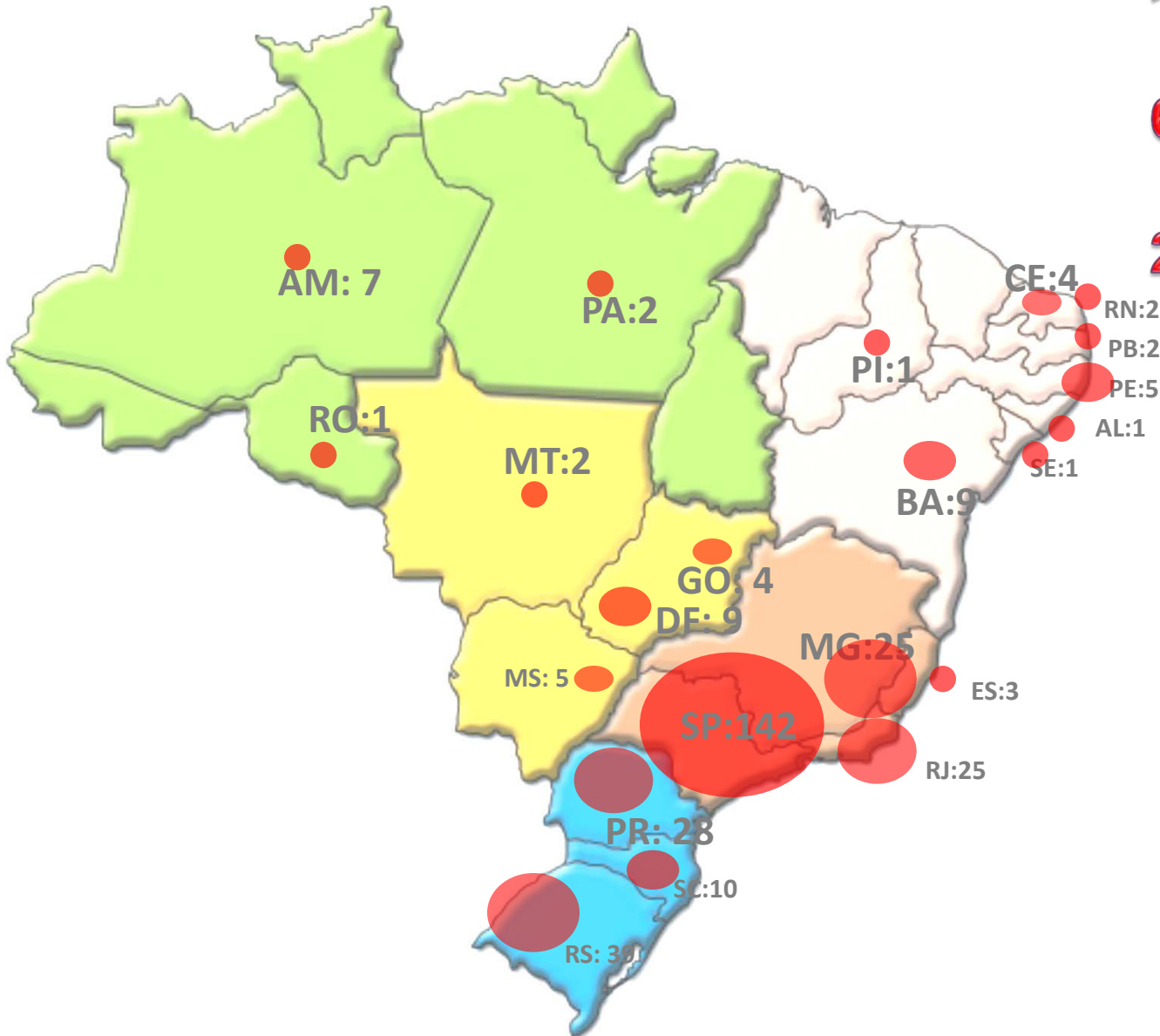
**Embrapa**

# Institutions with Biosafety Quality Certificate (CQBs)

> 331 CQBs

60% Agriculture

29 Embrapa Units





# The National Biosafety Technical Commission (CTNBio)

Linked to the Ministry of Science Technology and Innovation.

It has a President and is organized in 4 subcommissions:

Human health

Animal health

Plant health

Environment

An **Executive Secretariat** provides technical and administrative support to CTNBio members and facilitate the meetings.

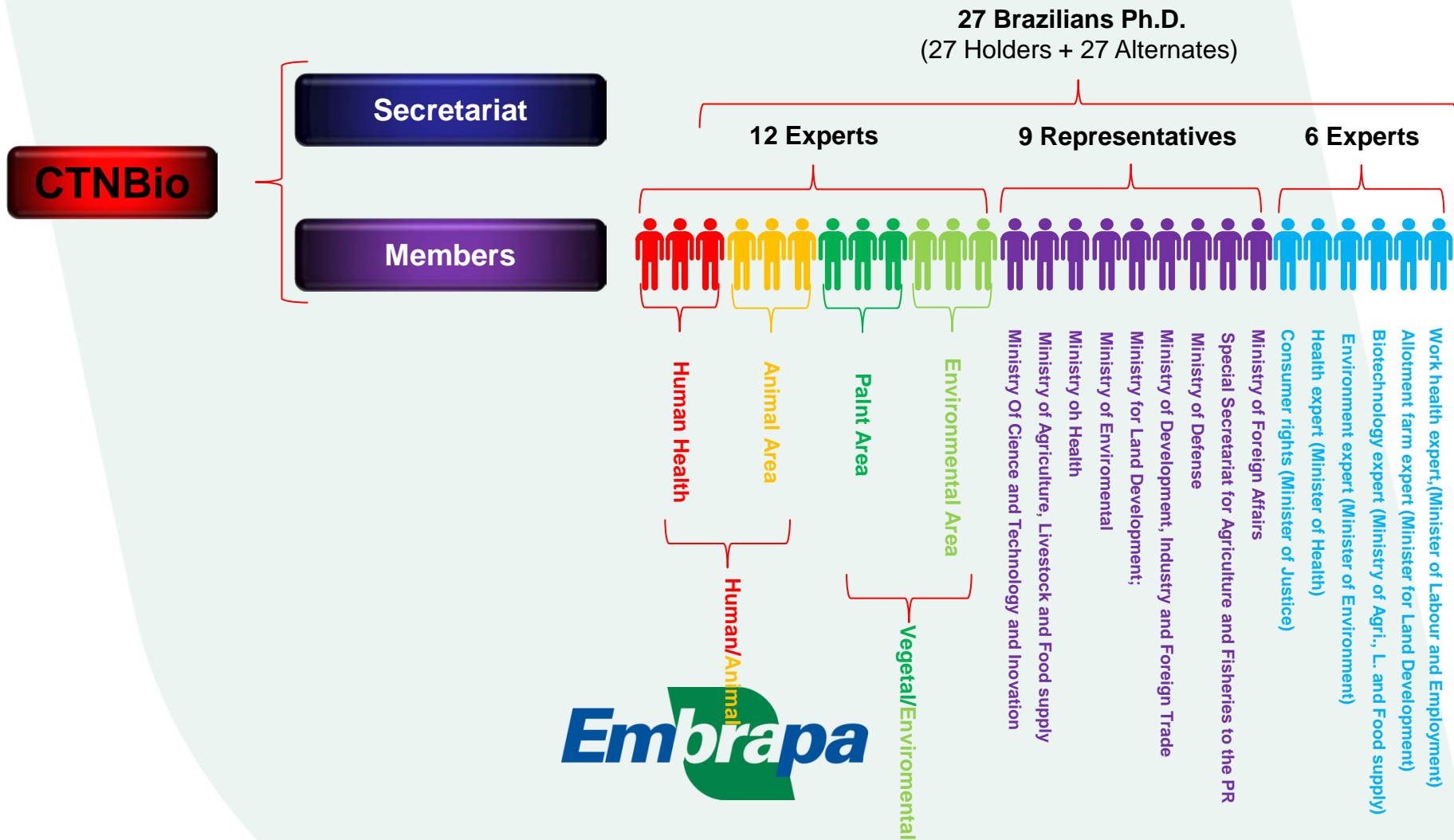
# The National Biosafety Technical Commission (CTNBio)

Meetings at least once a month;

The Technical Opinion of CTNBio is legally binding for the other Federal Agencies.

All decisions and technical opinions are necessarily published in the Federal Journal (DOU).

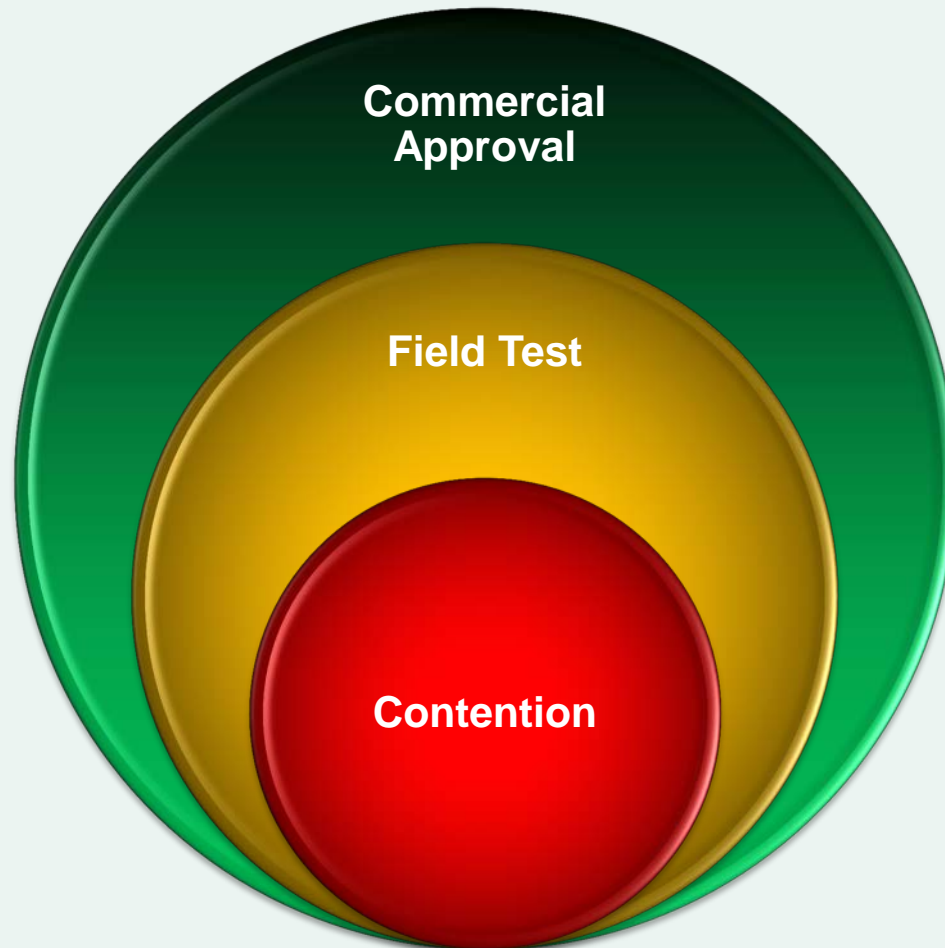
# The National Biosafety Technical Commission (CTNBio)



# It competes to the CTNBio:

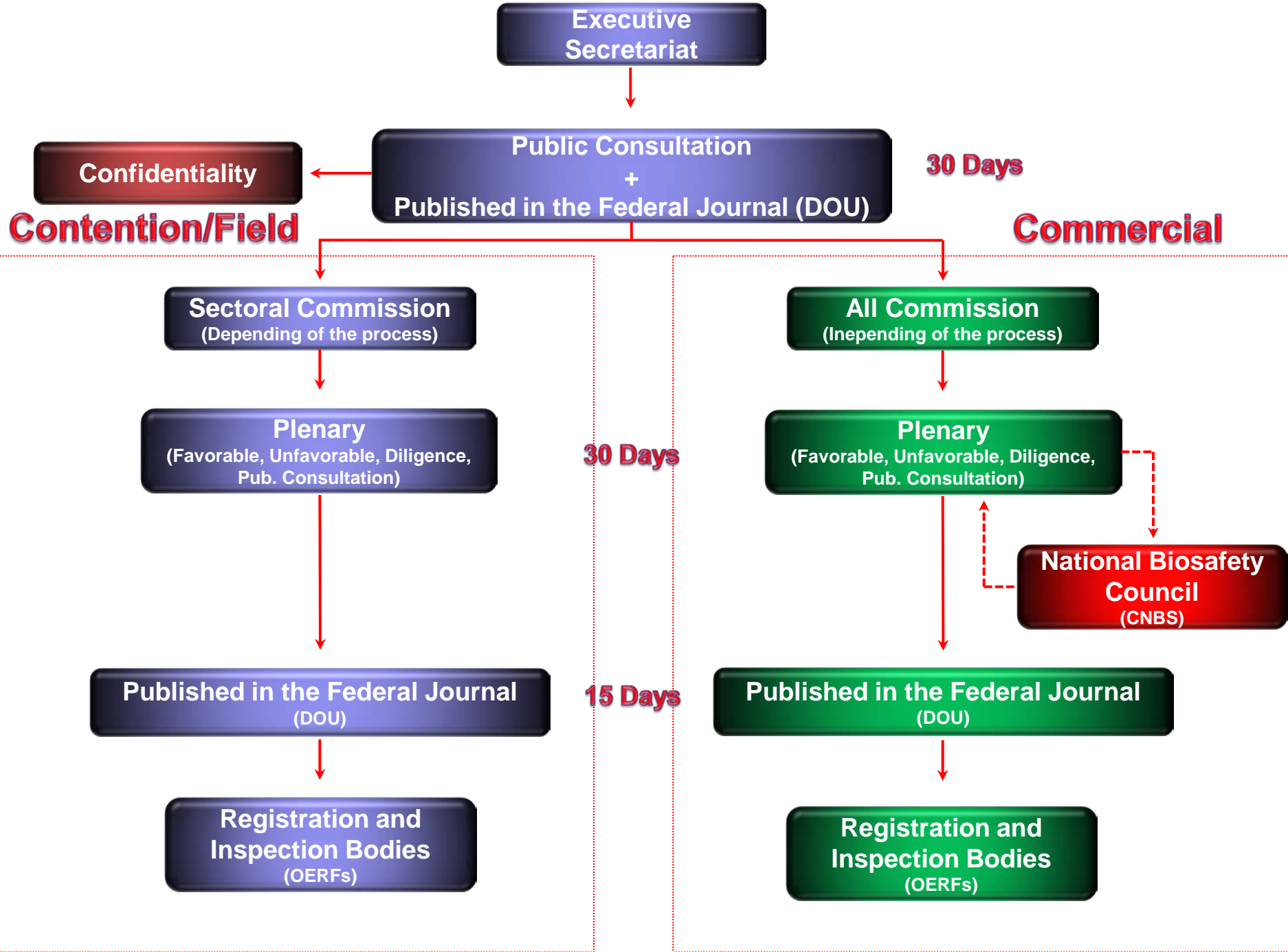
- 1) To establish norms for research with GMOs;
- 2) To issue the Quality Certificate of Biosafety (CQB);
- 3) To authorize research with GMOs;
- 4) To authorize importation of GMOs for research;
- 5) To give technical support to the Inspection Agencies;
- 6) To proceed the GMOs risk analysis, case by case
- 7) Among others...

# From the Lab to the Market



**~ 1% =  
Commercial  
Approvals**

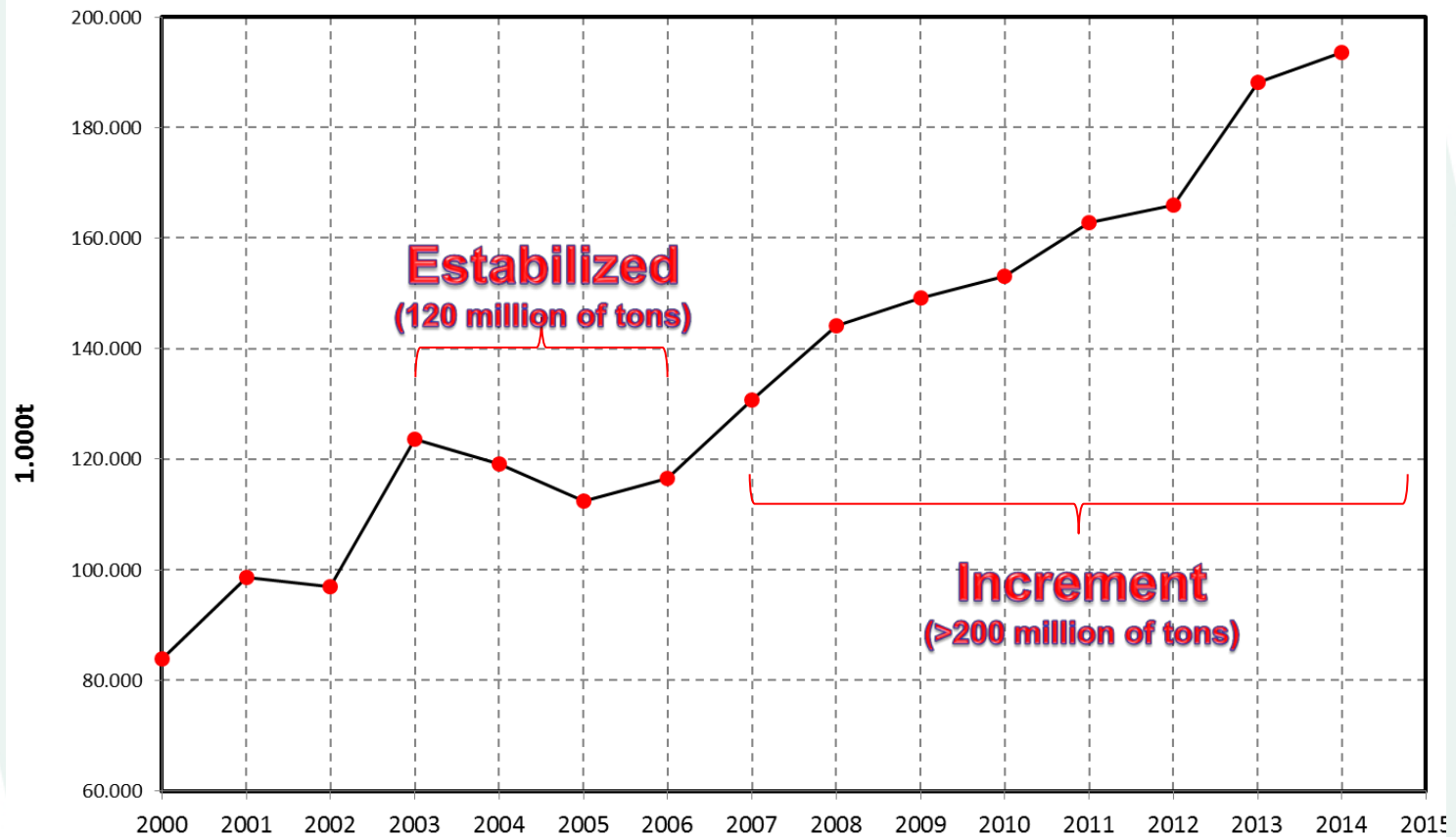
**Embrapa**



# Pipeline of GM Crops






# Grain Production in Brazil





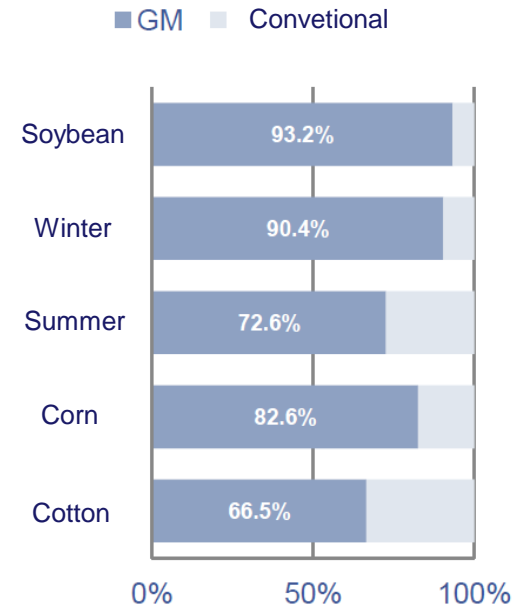
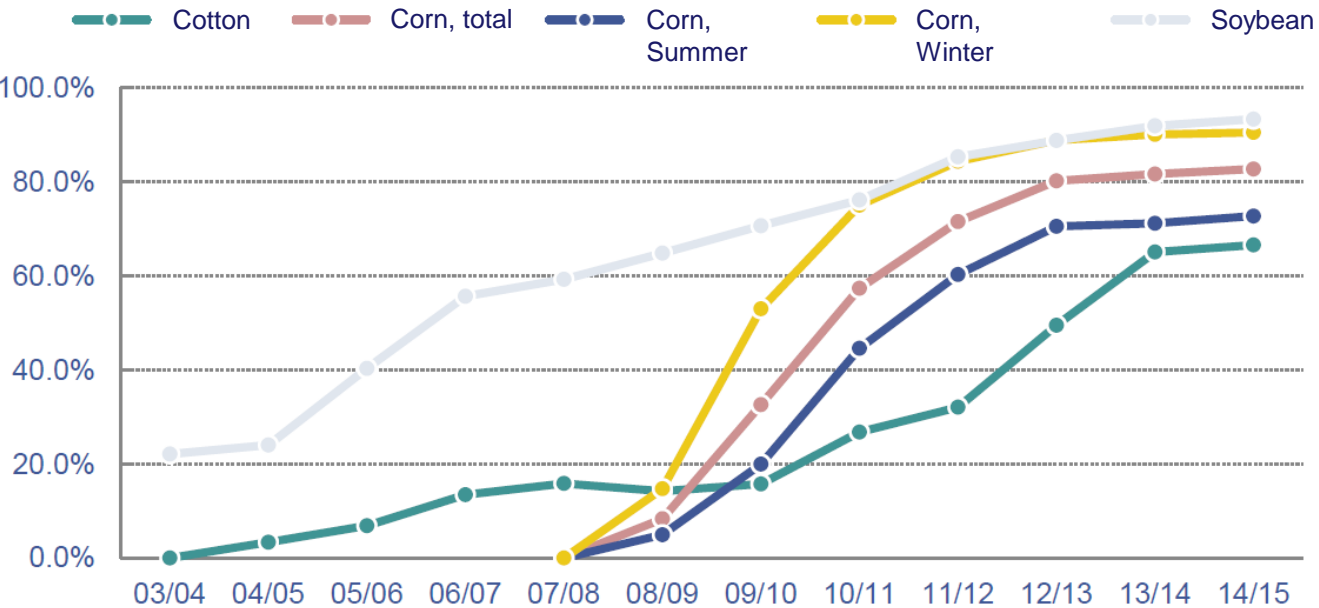
# Adoption of GM Crops in Brazil

2014 (Million hectares)

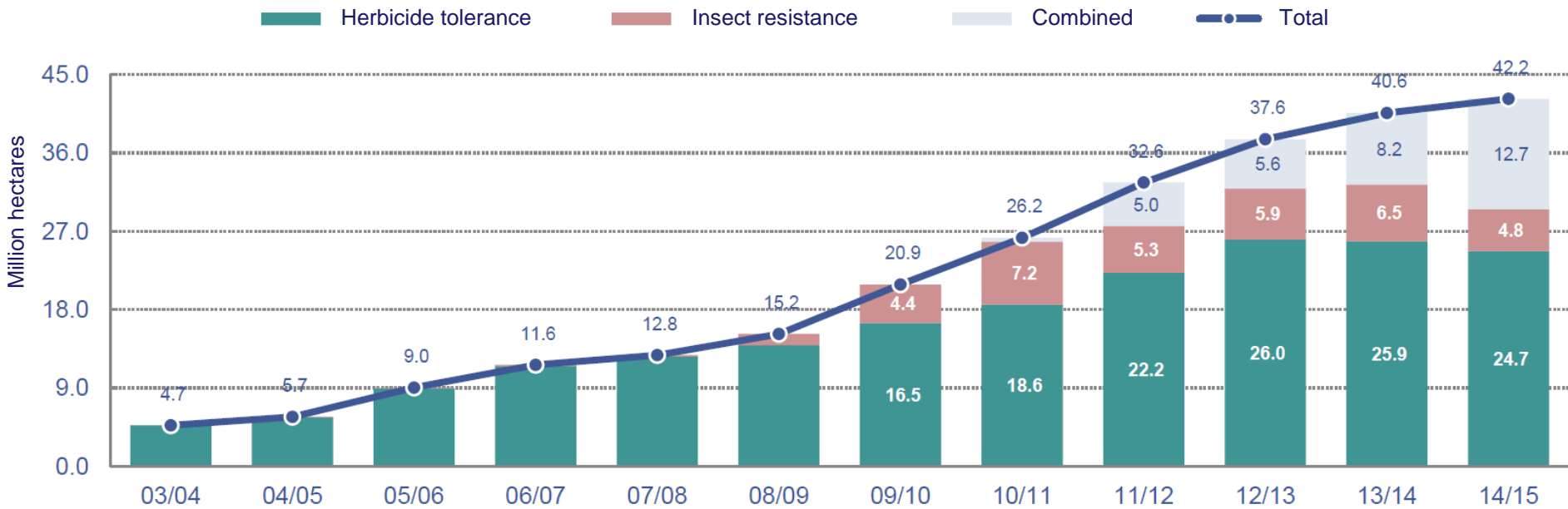
Crop	Conventional	GM	Total	
<b>Soybean</b>	2,45	27,41	29,86	 <b>93,2%</b>
<b>Corn</b>	2,82	12,45	15,27	 <b>82,6%</b>
<b>Cotton</b>	0,39	0,71	1,10	 <b>66,5%</b>



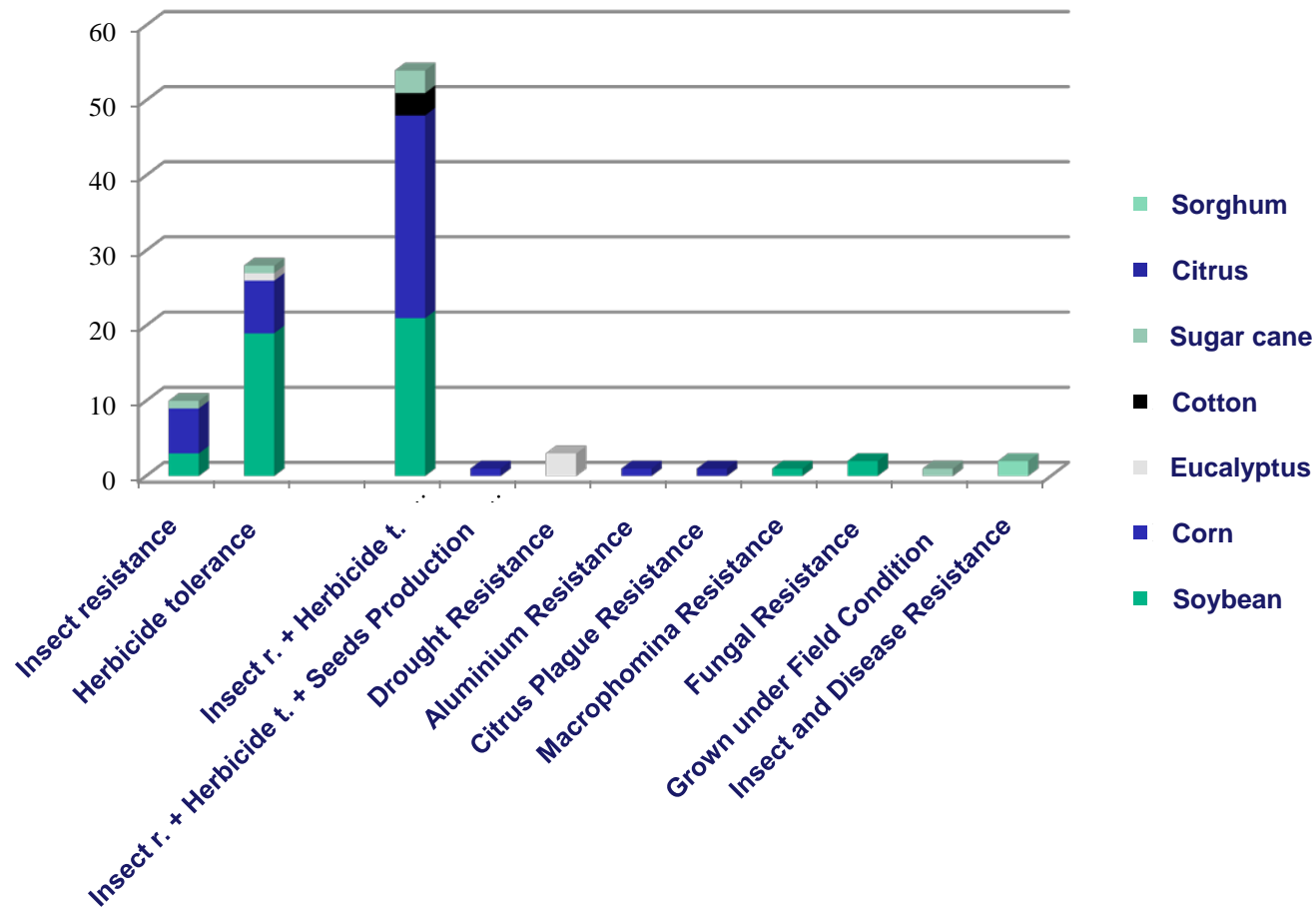
# Adoption of GM Crops in Brazil



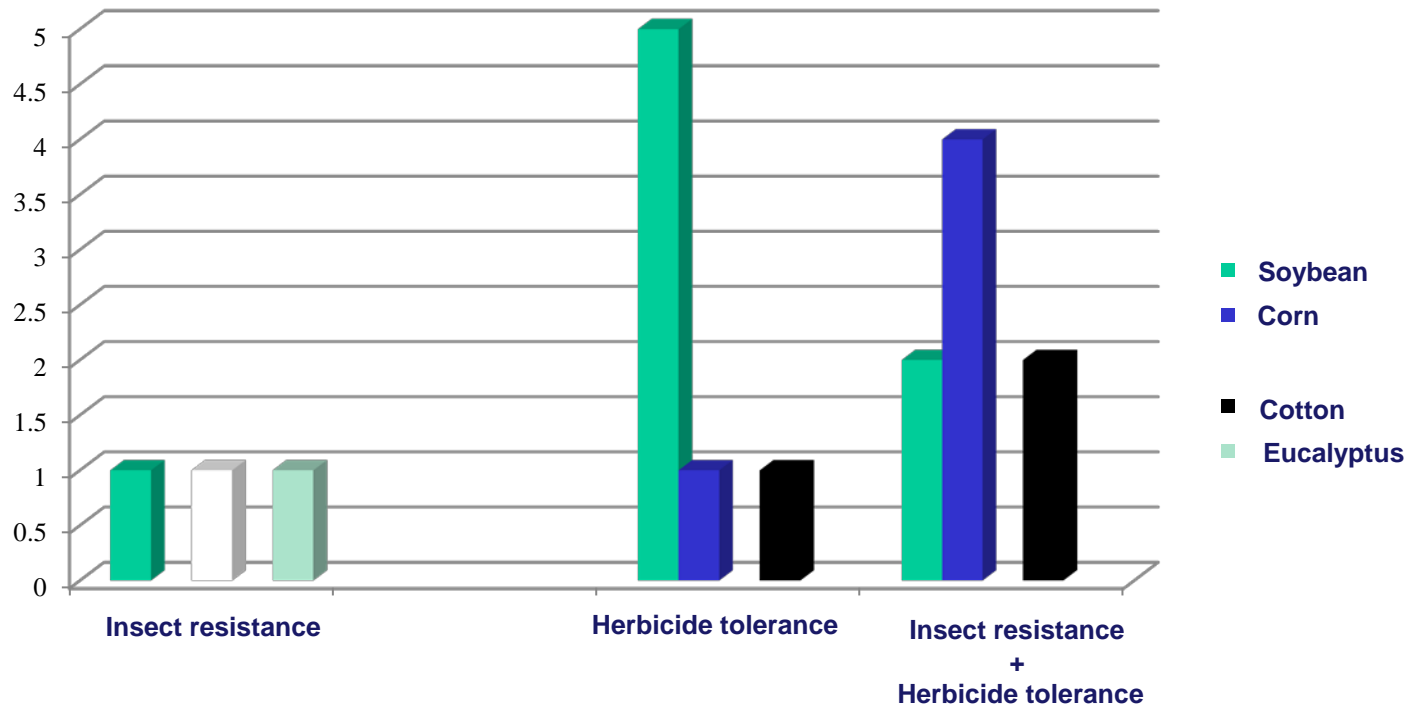
# Adoption of GM Crops in Brazil by tolerance/resistance



# Field Tests 2014

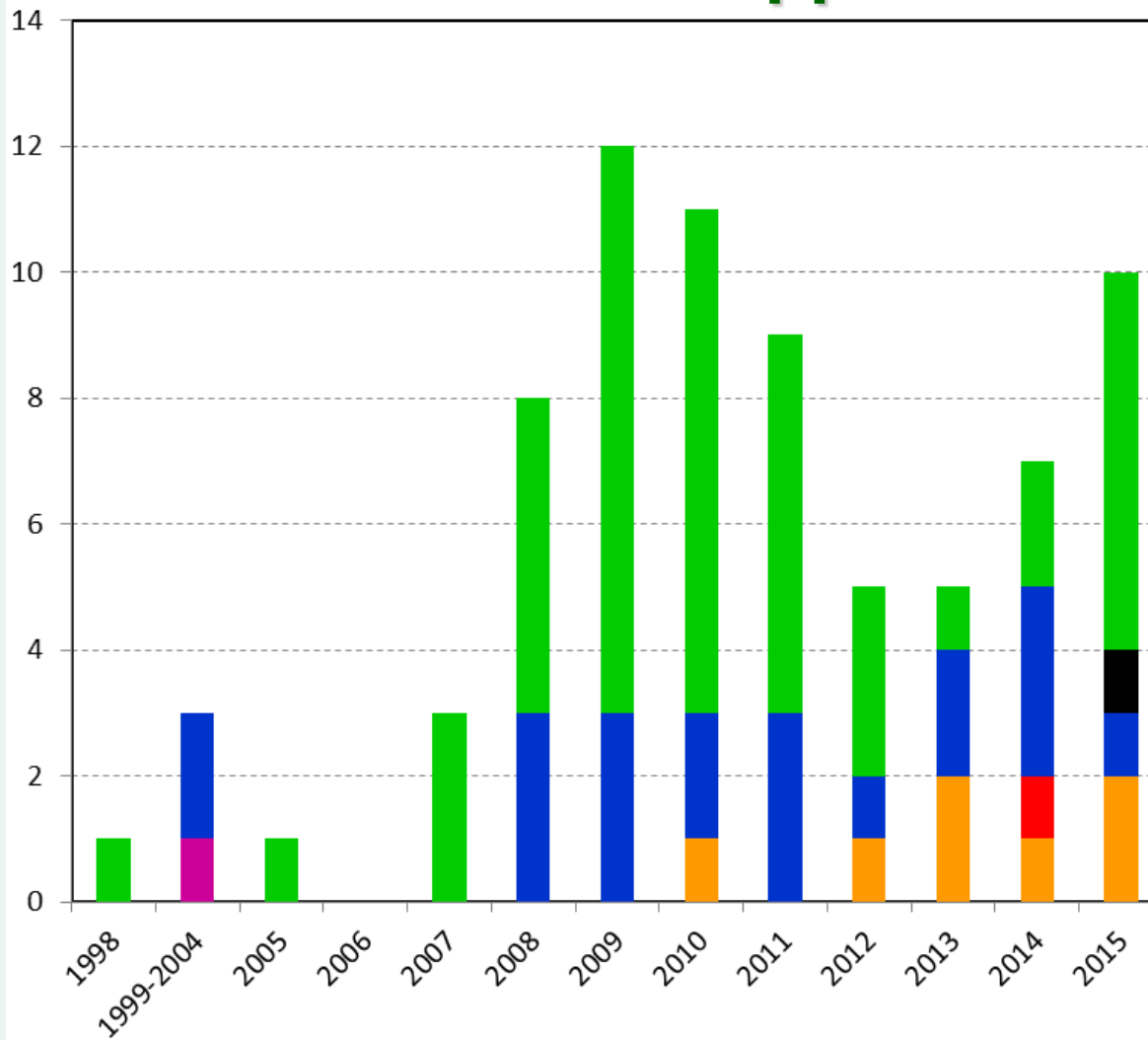


# Field Tests 2015



# Commercial Approvals

**92%**  
**Agriculture**  
**+**  
**Forestry**  
**production**



- Plant
- Human vaccine
- Animal vaccine
- Mosquito
- Enzymes
- Microorganisms

**Embrapa**

# Commercial Plants Approvals in Brazil



## Corn - 29

- T25 - Liberty Link
- MON 810 - YieldGard
- Bt11
- NK 603 - Roundup Ready 2
- GA21
- TC 1507 - Herculex
- MIR162 - Viptera
- MON 810 x NK603 - YieldGard/RR2
- Bt11 x GA21
- MON 89034 - YieldGard VT Pro
- TC1507 x NK603
- MON 89034 x NK 603 - YieldGard VT Pro
- Bt 11 x MIR 162 x GA21
- MON 88017 - YieldGard VT Rootworm/RR2
- MON 89034 x TC 1507 x NK 603
- TC 1507 x MON 810 x NK 603
- TC 1507 x MON 810
- MON 89034 x MON 88017
- TC1507 x DAS-59122-7
- Bt11xMIR162xMIR604XGA21
- MIR604
- DAS-40278-9
- NK603 x T25
- TC1507 x MON810 x MIR162 x NK603
- TC1507xMIR162xNK603
- TC1507xMIR162
- MIR162xNK603
- MON810xMIR162
- TC1507 x MON810 x MIR162



## Cotton - 12

- MON 531 - Bolgard I
- LLCOTTON25 - Liberty Link
- MON 1445 - Roundup Ready
- 281-24-236/3006-210-23 Widestrike
- MON 15985 - Bolgard II
- MON 531 x MON 1445
- GHB 614 - GlyTol
- GHB 119 x T 304-40 - TwinLink
- MON 88913
- GlyTol x TwinLink
- GlyTol x LibertyLink
- MON 15985 X MON 88913



## Soybean - 6

- GTS-40-3-2 - Roundup Ready
- BSP-CV127-9 - Cultivance
- A-2704-12 - Liberty Link
- A 5547-127 - Liberty Link
- MON 87701 x MON 89788 - Intacta RR2 PROTM
- DAS-68416-4



## Bean - 1

- EMBRAPA 5.1



## Eucalyptus - 1

- H421



# Other Commercial Products Approved in Brazil



## Animal vaccines - 20

- Recombitek Cães
- Vaxxitek MD/IBD
- Suvaxyn PCV2
- Ingelvac
- Poulvac Aves/*E. coli Fort Dodge*
- Vectormune FPMG
- Vectormune **FPMG+AE**
- Vectormune HVTIBD
- Vectormune FPLT
- Vectormune FPLT-AE
- Vectormune HVTNDV
- PouvacSt
- INNOVAX
- *Intervet*
- InnovaxND
- ProteqFlu TE
- ProteqFlu
- Provac
- B058
- Bovella



## Yeasts - 6

- RN1016
- *Prototheca*
- Y5056
- Y1979
- Bioprodutos Prothotheca
- *S. Cerevisiae* - Celere2L



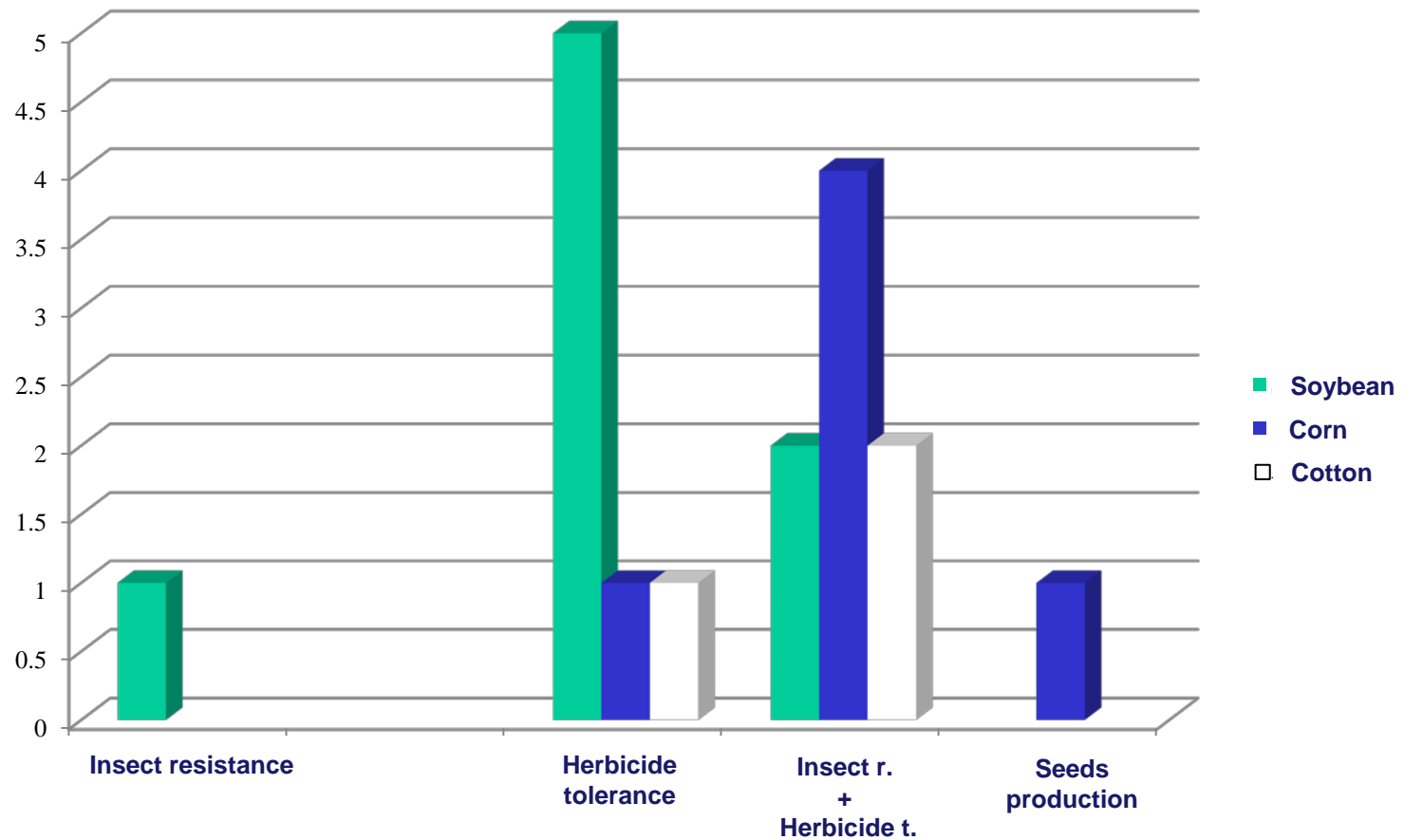
## Mosquito - 1

- Suppression of populations of Aedes





# Commercial Process in analysis



**Embrapa**





Brazilian Agricultural Research Corporation

Establishment: **1973**.



We are a technological innovation enterprise focused on generating knowledge and technology for Brazilian agriculture

Linked to the Ministry of Agriculture, Livestock and Food Supply (MAPA).

## MISSION

Provide solutions for research, development and innovation for sustainability of agriculture for the benefit of Brazilian society.

# Embrapa

15

Central Units  
located in Brasília

47

Decentralized Units  
in all regions of  
Brazil

4

Virtual Laboratories  
Abroad (Labex), in  
the USA, Europe,  
China and South  
Korea

3

International Offices  
in Latin America  
and Africa



9.790 employees



47 Research Centres :

- 17 Ecoregional Units
- 14 Product Units
- 11 Basic Theme Units
- 5 Service Units

# International Presence

## Scientific Cooperation, Technical Cooperation Technological Business and Global Policies



Source: SRI-Embrapa – April / 2015

4

Virtual Laboratories  
Abroad (Labex), in  
the USA, Europe,  
China and South  
Korea

3

International Offices  
in Latin America  
and Africa



Brazilian Agricultural Research Corporation  
Ministry of Agriculture, Livestock, and Food Supply



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# Agritempo

Agricultural weather monitoring system has new version

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8/25/15 | Genetic improvement

**Parceria Embrapa-Basf  
lança Sistema de  
Produção de soja  
Cultivance**

8/26/15 | Biodiversity

**Pesquisa apresenta alternativas para a agricultura  
sustentável na bacia Guapi-Macacu, no RJ**

8/25/15 | Mechanization and Automation

**Drones auxiliam no aumento da produtividade no campo**

## Embrapa in Brazil



» Browse and learn more about our units

## International Operations



» Embrapa's international activities

**THANK YOU**

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