

Global Grain Market and Brazilian Agriculture Update

*The plant biotechnology and biosafety workshop
CECAT Workshop*

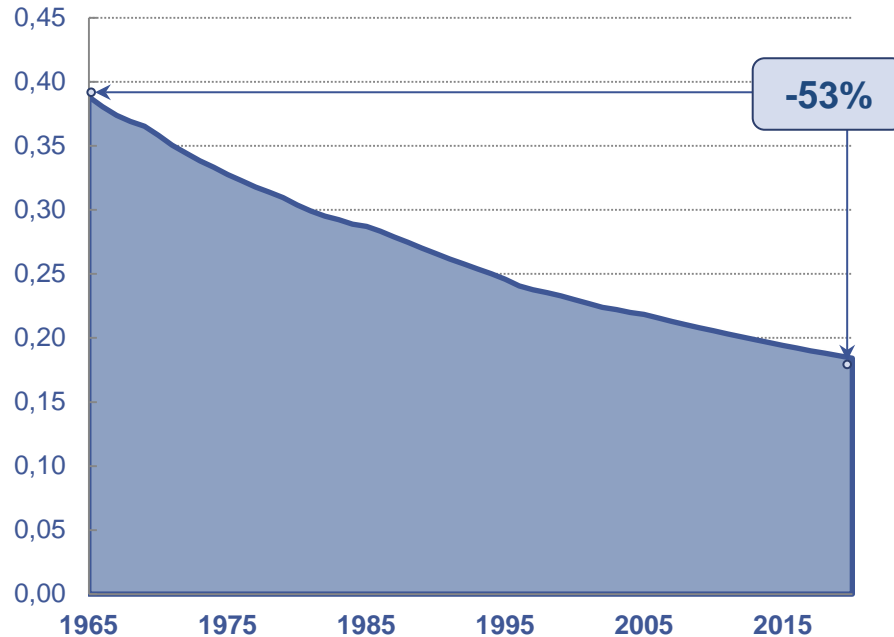
by Anderson Galvão

Brasília, DF
April, 2013



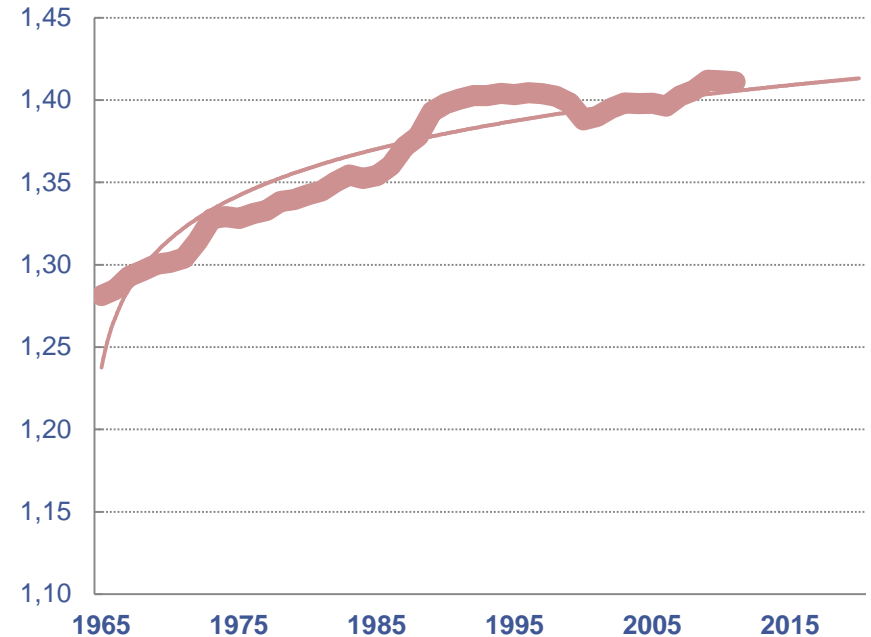
Agricultural sustainability is fundamental against the growing shortage of productive resources

Available agricultural land (ha/inhab./year)



The availability per capita of agricultural areas falls each year, with population growth, urbanization, infrastructure growth, desertification, and other factors

Annual planted area ^{1/} (billion ha)



- Now the growth of total cultivated area decelerated in the last few years, due to:
 - ▶ Occupation of noble agricultural areas
 - ▶ Growing marginal costs
 - ▶ Environmental restrictions for new expansions

Source: FAOStat | Elaboration: CÉLERES® | ^{1/} Includes cereals, oilseeds, fruits and other agricultural food crops

What the world eats?

Family Aboukabar | Breidjing refugee camp, Chade (Central Africa)

US\$ 1.23 per week in food



Source: Hungry Planet: What the World Eats? ; Peter Manzel | The Time Magazine

What the world eats?

Family Ahmed | Cairo, Egypt

US\$ 69 per week in food



Source: Hungry Planet: What the World Eats? ; Peter Manzel | The Time Magazine

What the world eats?

Family Dong | Beijing, China

US\$ 155 per week in food



Source: Hungry Planet: What the World Eats? ; Peter Manzel | The Time Magazine

What the world eats?

Family Revis | North Carolina, USA

US\$ 342 per week in food



Source: Hungry Planet: What the World Eats? ; Peter Manzel | The Time Magazine

What the world eat?






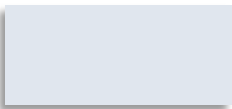
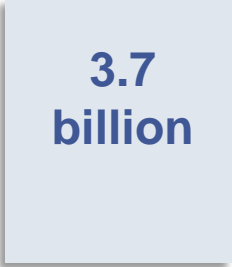
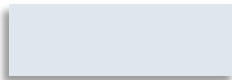
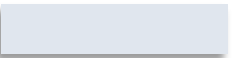
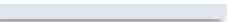





Family Melander | Bargteheide, Germany

US\$ 500 per week in food



Source: Hungry Planet: What the World Eats? ; Peter Manzel | The Time Magazine

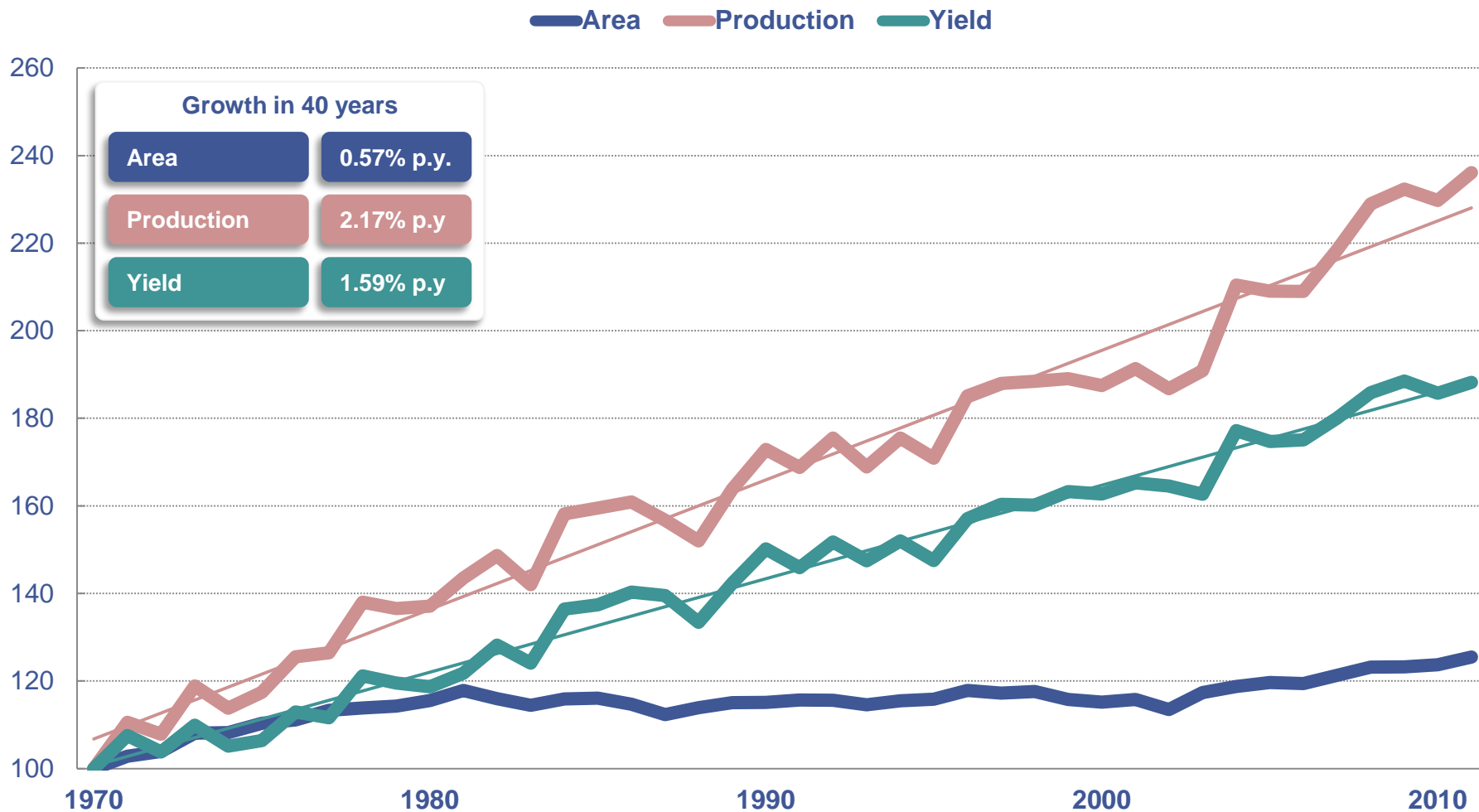
The world is not plain as the strategies to create and capture value within the food value chain

Weekly expense	<p>US\$ 1.23</p> 	<p>US\$ 69</p> 	<p>US\$ 155</p> 	<p>US\$ 342</p> 	<p>US\$ 500</p> 
# People	<p>1.4 billion</p> 	<p>3.7 billion</p> 	<p>1.0 billion</p> 	<p>±0.7 billion</p> 	<p>< 0.2 billion</p> 
Strategies	<p>Strategies to assure minimal conditions of food supply.</p> <p><i>Ex: Somalia, African Continent</i></p>	<p>Good quality food supply, but with accessible prices, respecting cultural aspects</p> <p><i>Ex: North Africa, Northeast Brazil</i></p>	<p>Food rich in nutritional value, with migration to proteins. The big source.</p> <p><i>Ex: China, Indonesia, Brazil, BRICS</i></p>	<p>The start of niches market, with precise qualitative requirements.</p> <p><i>Ex: Developed countries</i></p>	<p>Very different strategies for food supply. Organics, specials...</p> <p><i>Ex: Japan, Switzerland, Norway, etc...</i></p>
					

Source: CÉLERES® based on ONU/FAO/FMI data

The food production grows, at the last four decades, based on yield gains

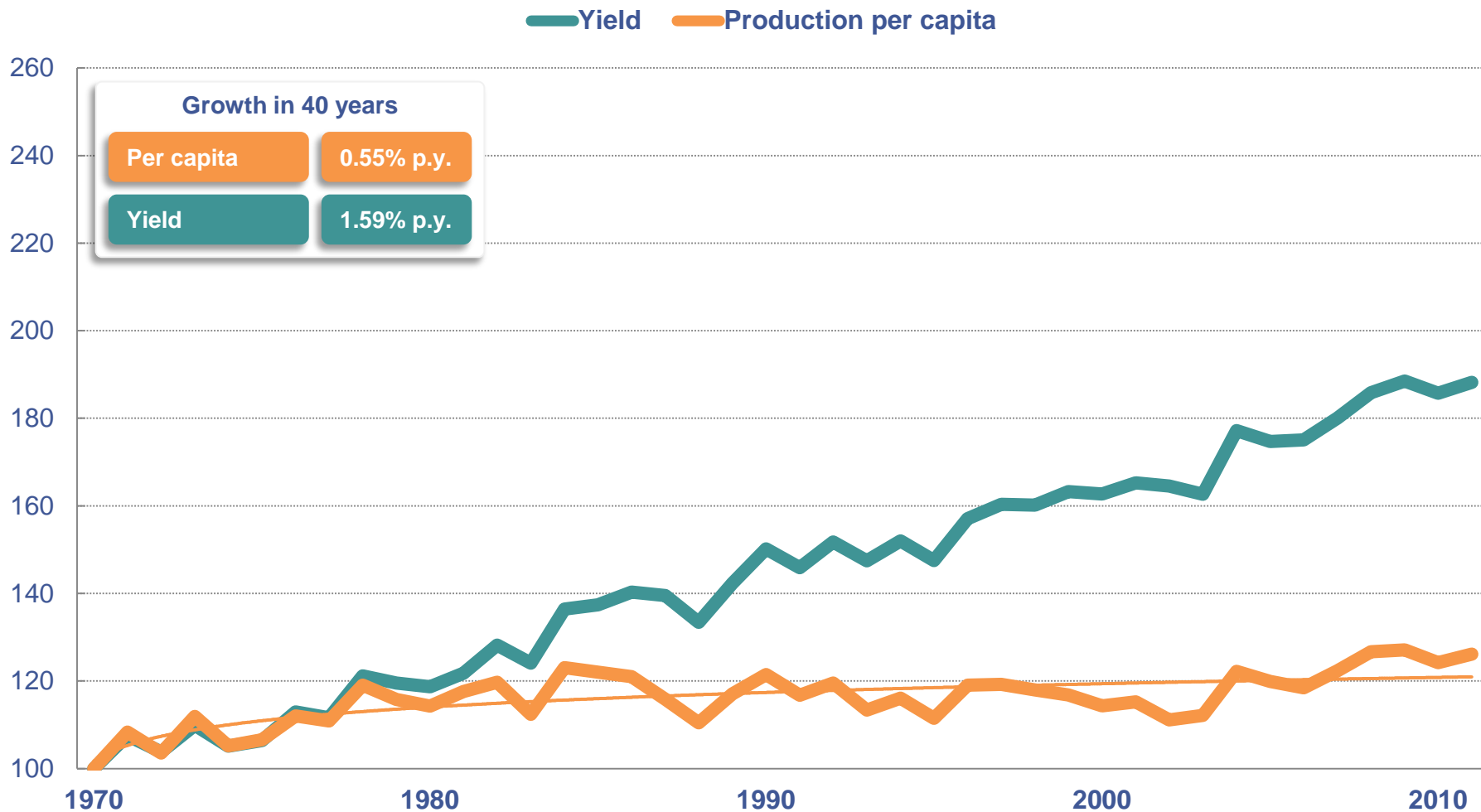
Global production of grains and oilseeds



Source: USDA/FAO/US Census Bureau | Elaboration: CÉLERES® | September/2011 | Base 100: 1970 | Includes main grains and oilseeds

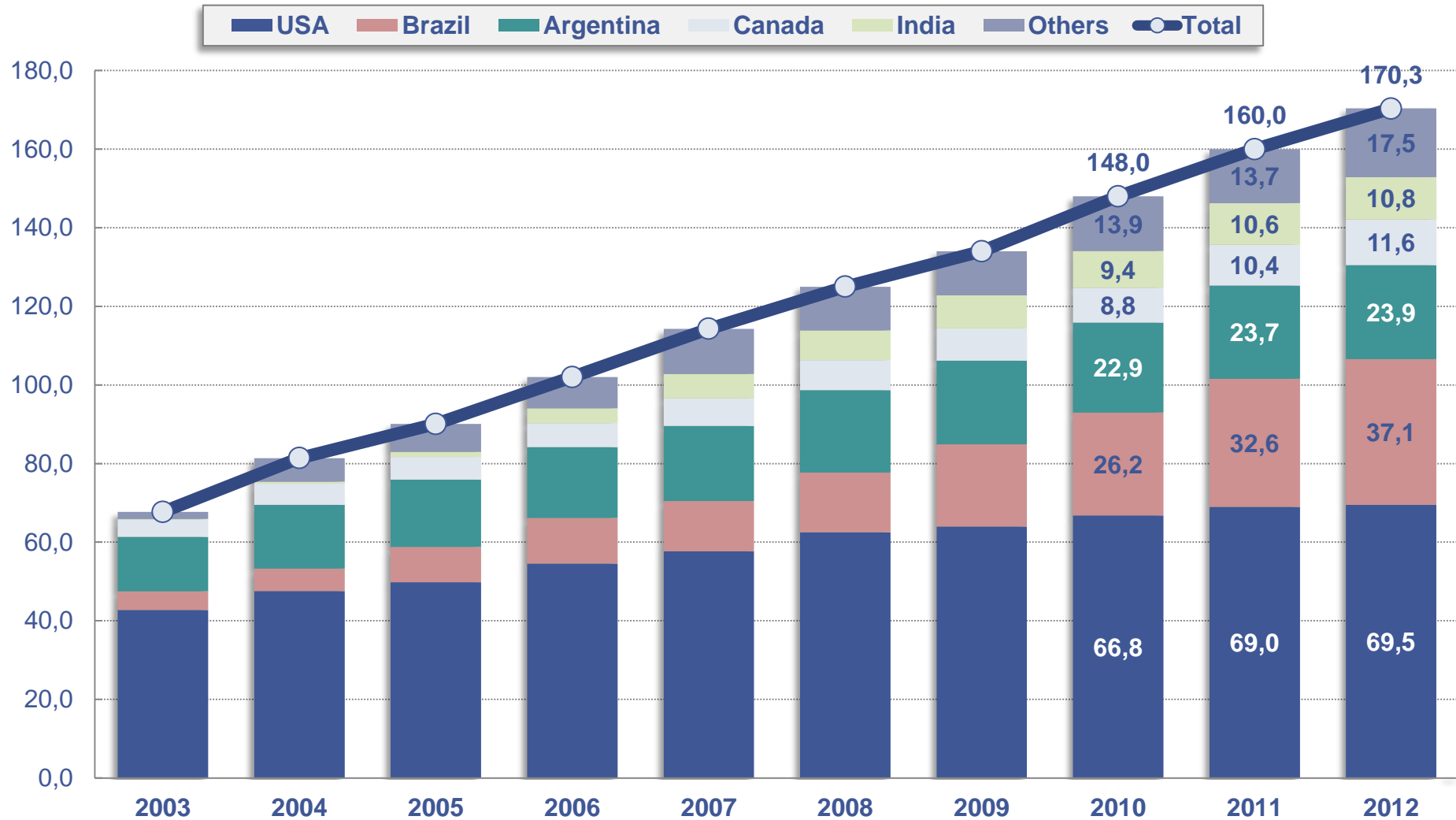
But even though, yield gains have been partly annulled by the population growth

Global production of grains and oilseeds and the impact of population growth



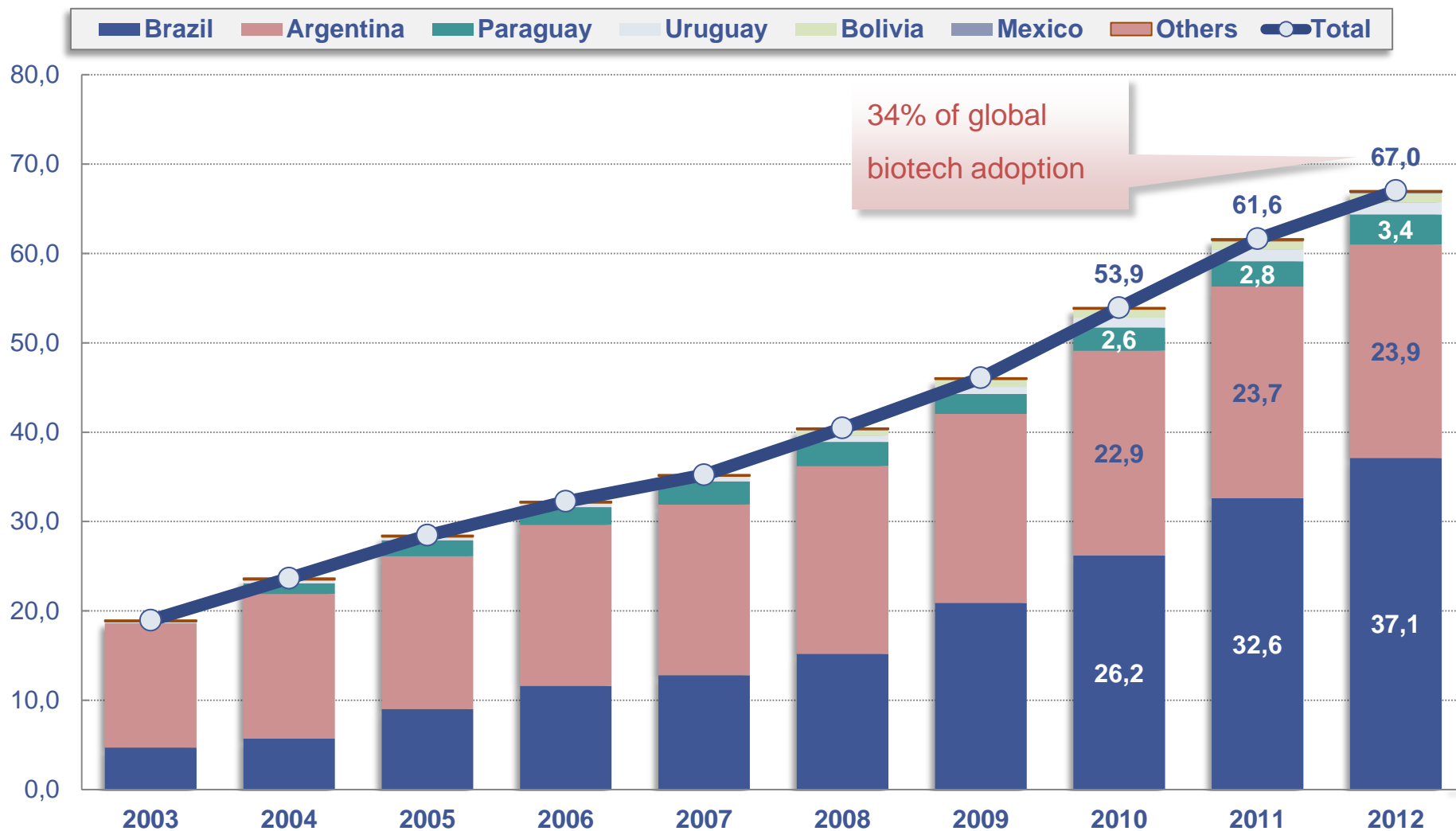
Source: USDA/FAO/US Census Bureau | Elaboration: CÉLERES® | September/2011 | Base 100: 1970 | Includes main grains and oilseeds

Crop biotechnology adoption, World by country, million hectares



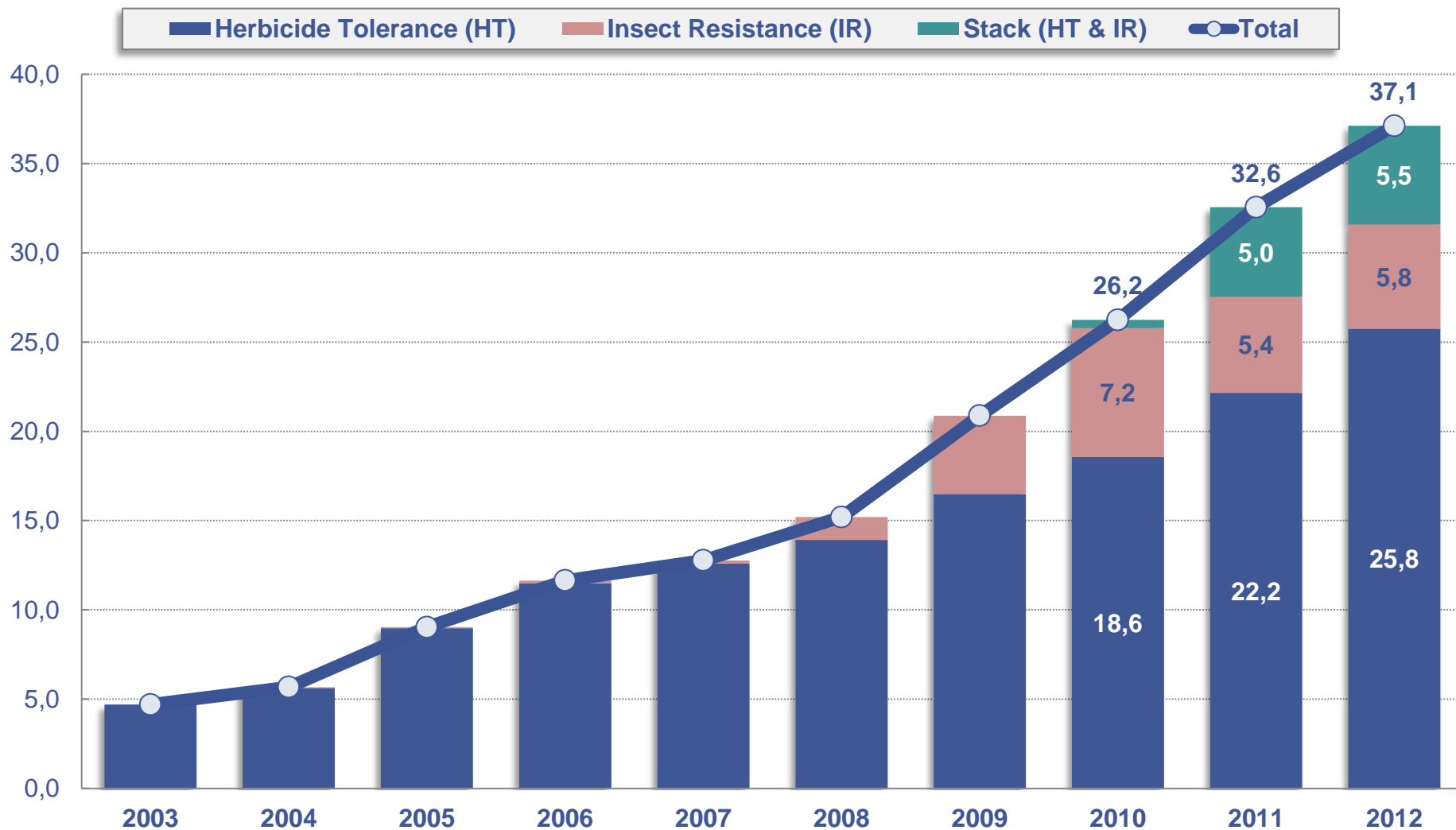
Source: JAMES, CLIVE (2012) | Note: Brazil in 2012, source CÉLERES®

Crop biotechnology adoption, Latin America by country, million hectares



Source: JAMES, CLIVE (2012) | Note: Brazil in 2012, source CÉLERES® | Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Honduras, Mexico, Paraguay, Uruguay

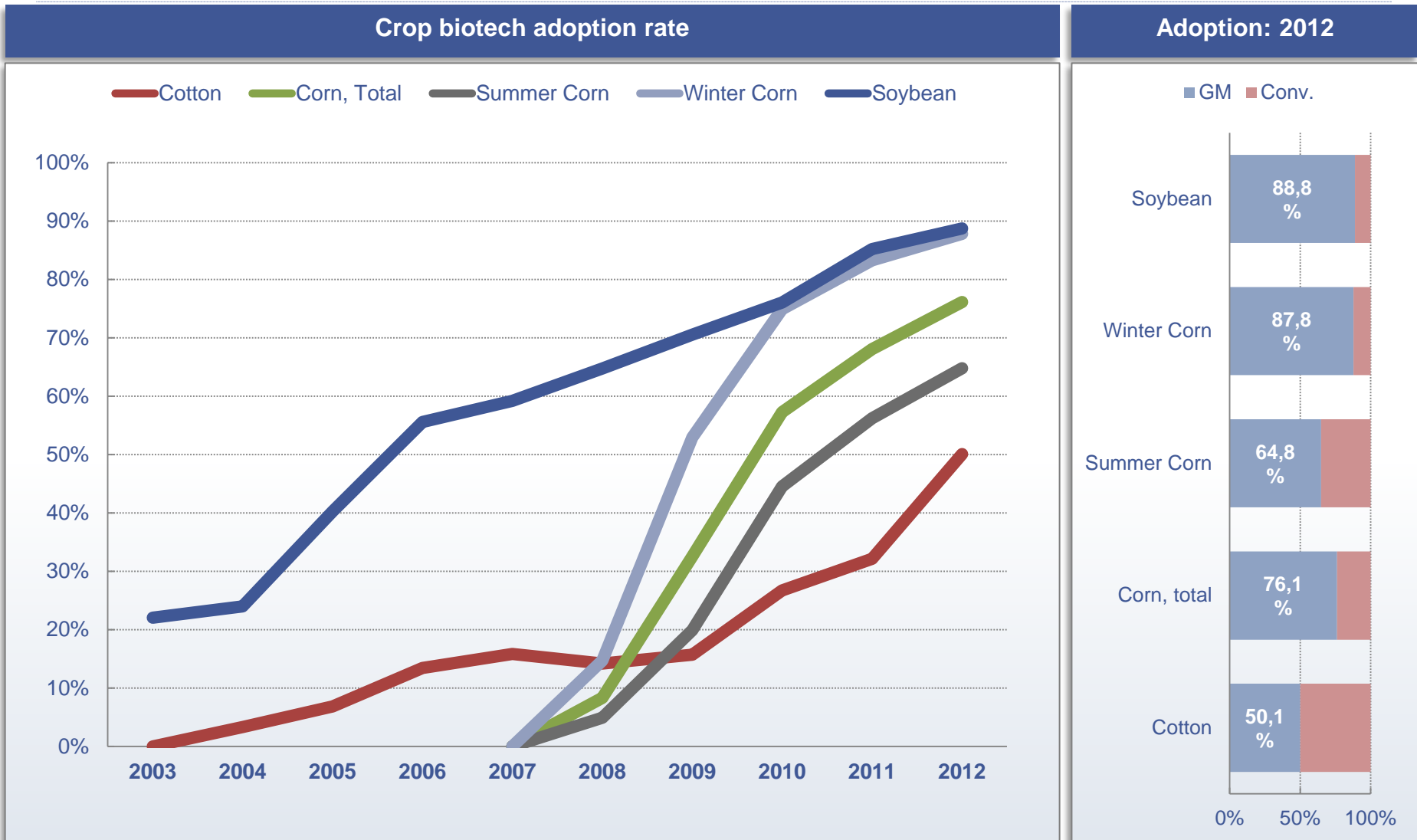
Crop biotechnology adoption, Brazil by trait, million hectares



Source: CÉLERES® | Updated in December/2012

Crop biotechnology adoption rate in Brazil, by crop

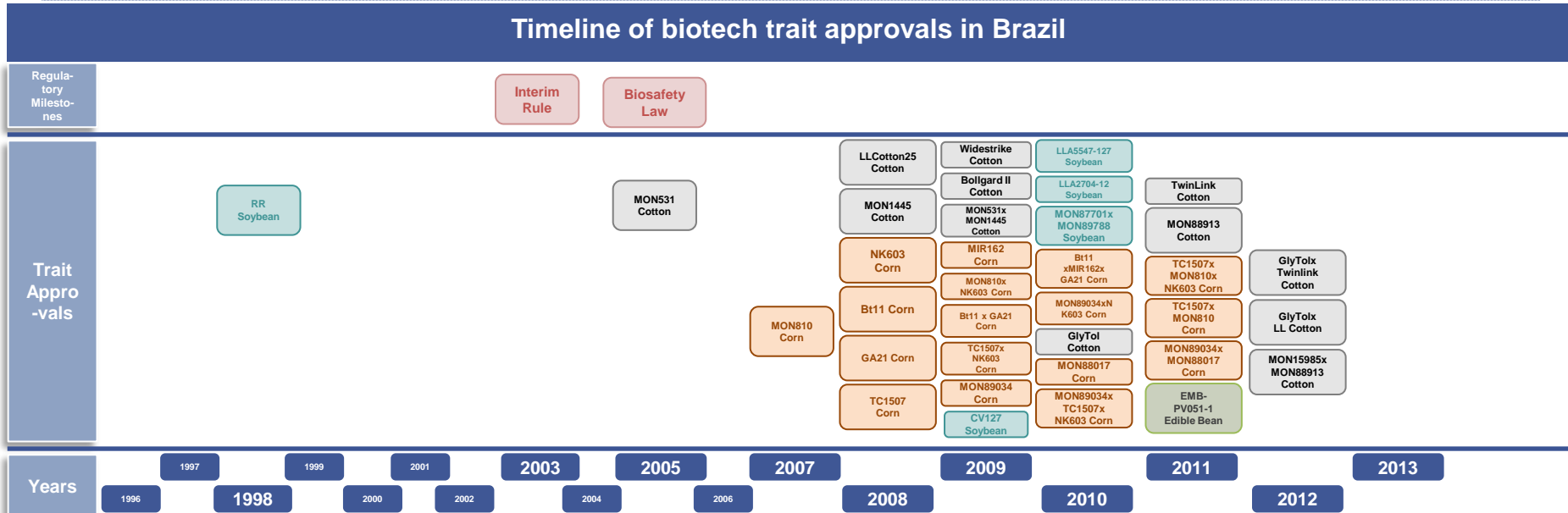
Winter corn reaches soybean rate, in barely four seasons



Source: CÉLERES® | Values in % of total area | Updated in December 2012

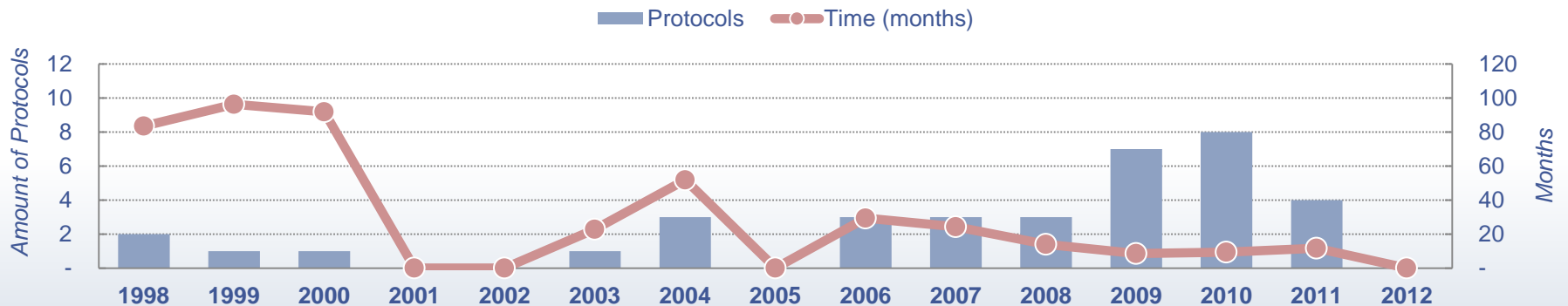
Crop biotechnology historical in Brazil

Timeline of biotech trait approvals in Brazil



Source: CTNBio | Elaboration: CÉLERES® | Updated December/2012

Progress of registers and average time of trait approvals

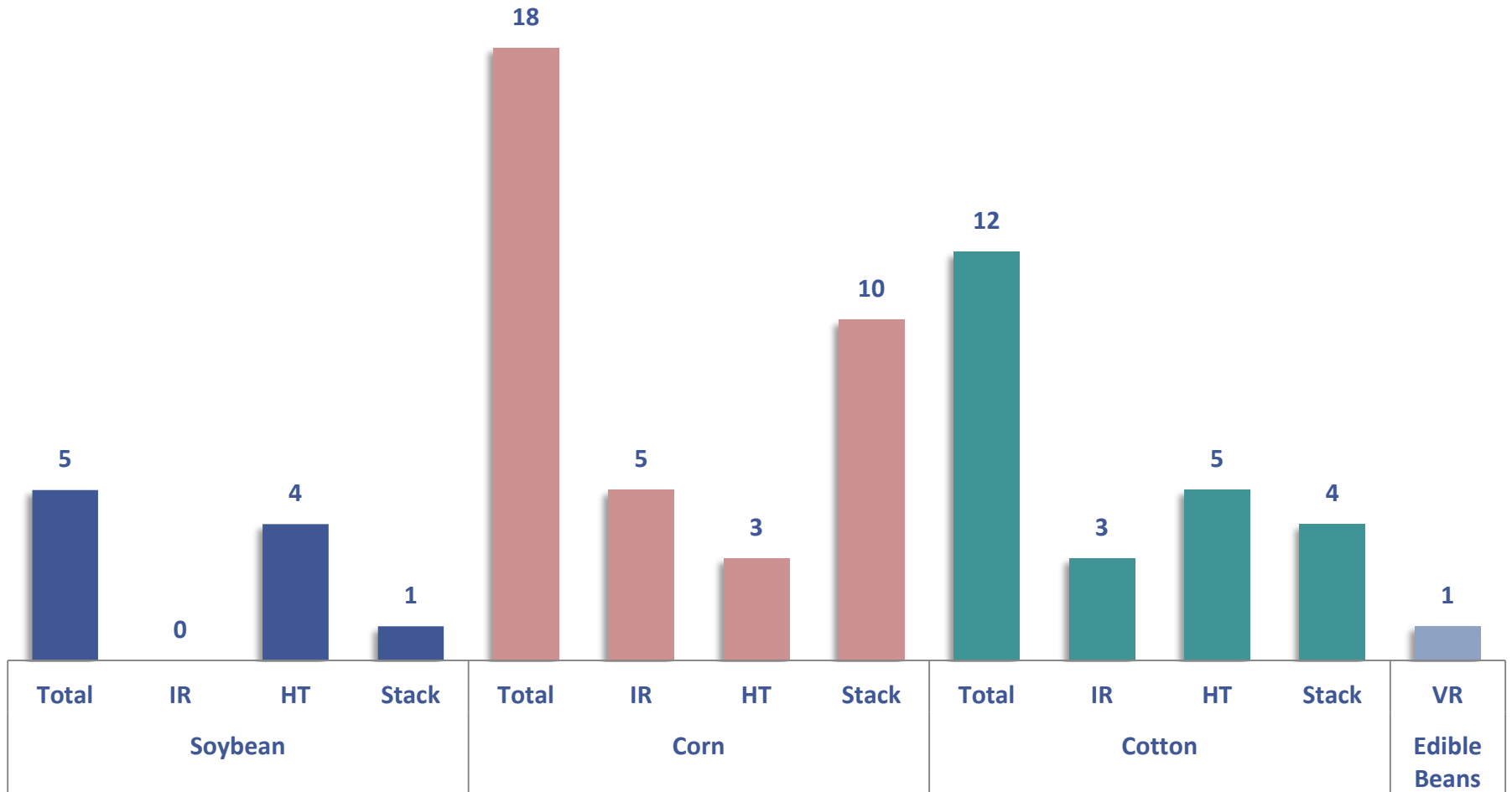


Source: CTNBio | Elaboration: CÉLERES® | Updated December/2012

Trait approvals are already 36 in Brazil

Corn crop leads the total of trait approvals

Trait approvals in Brazil, by crop and technology

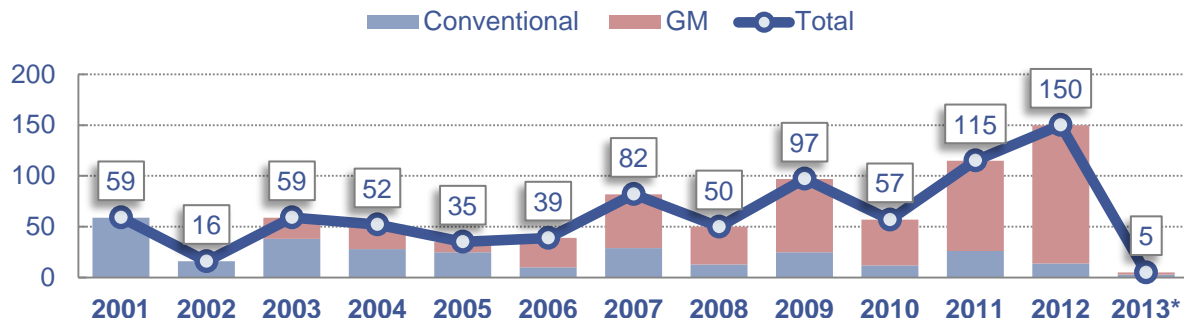


Source CTNBio | Elaboration: CÉLERES® | Considering just crops | Updated in December /2012

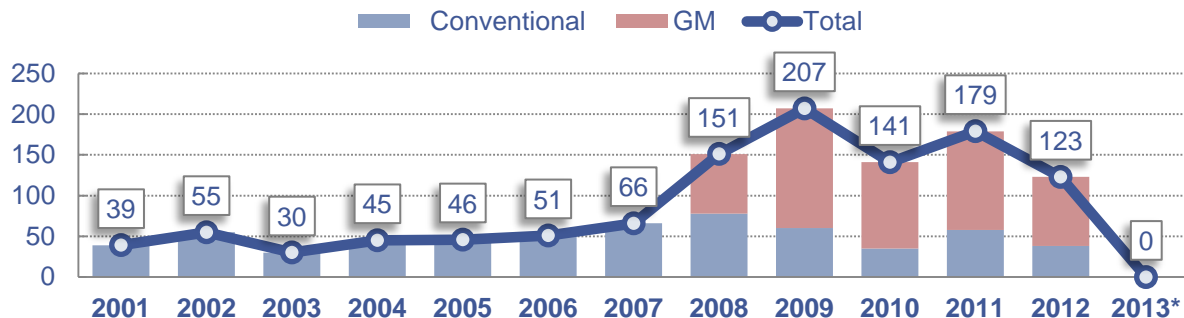
Varieties/hybrids register in Brazil

A strong example of biotech industry response

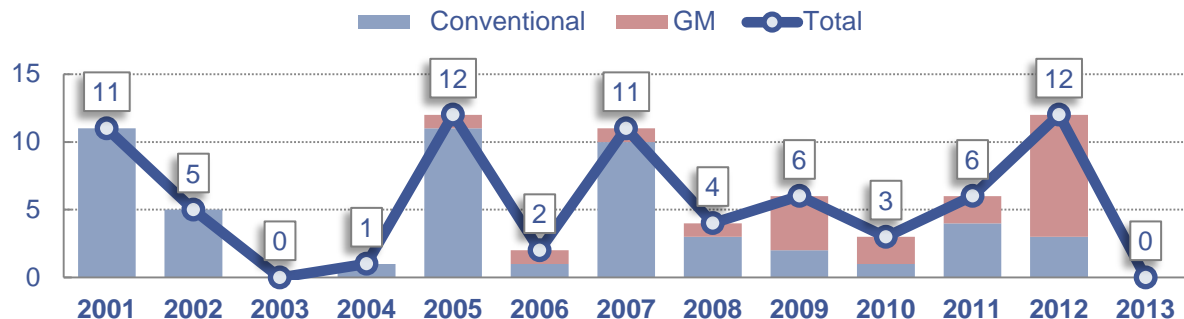
Soybean



Corn



Cotton



- In 2012, 136 GM varieties were registered (90,7%), including registers of stack soybean (INTACTA RR2 PRO) of many private and public companies.
- In contrast, were registered only 14 conventional soybean varieties (9,3%).

- Since 2009, the second year of GM corn hybrids register in Brazil, the register rate of GM corn was always higher than convention corn, 71,0% in 2009, 75,2% in 2010, 67,6% in 2011 and 69,1% in 2012.

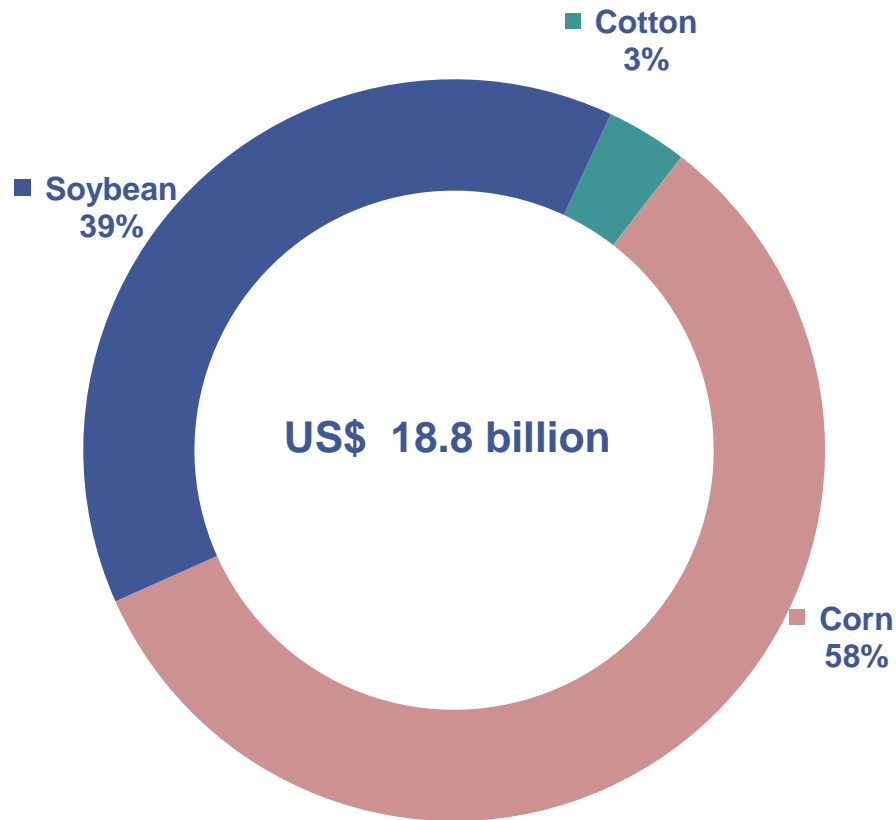
- The case of GM cotton in Brazil is different from soybean and corn, because the rate of "saved seeds" in higher in this crop. Subsequently, the cotton seed industry does not have incentives to improve investments in new technologies, conventional or GM ones.

Source: CTNBio | Elaboration: CÉLERES® | Updated January/2013

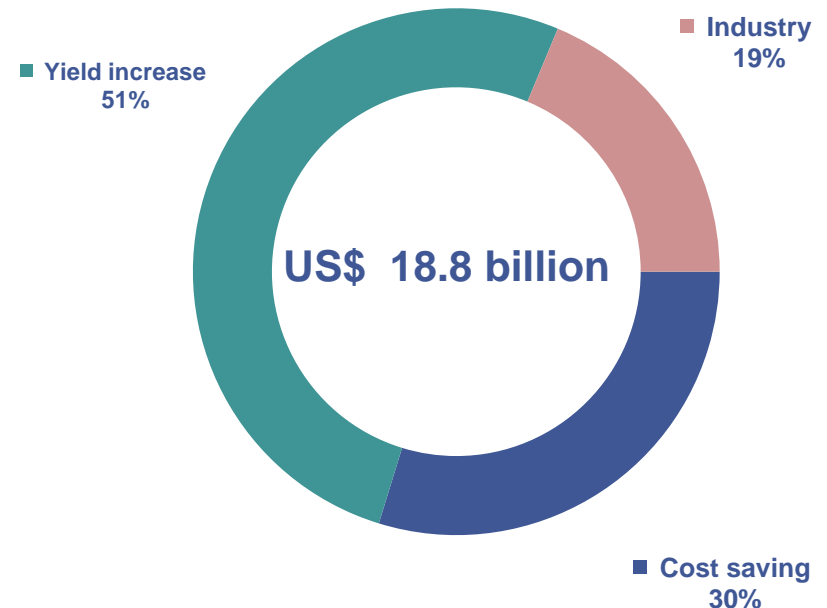
Corn yet represents 58% of total economical benefit generated by the introduction of Agri biotechnology in Brazil

Direct benefits of Agri biotech adoption in Brazil: 1996/97 – 2011/12

Economic Benefits, by crop



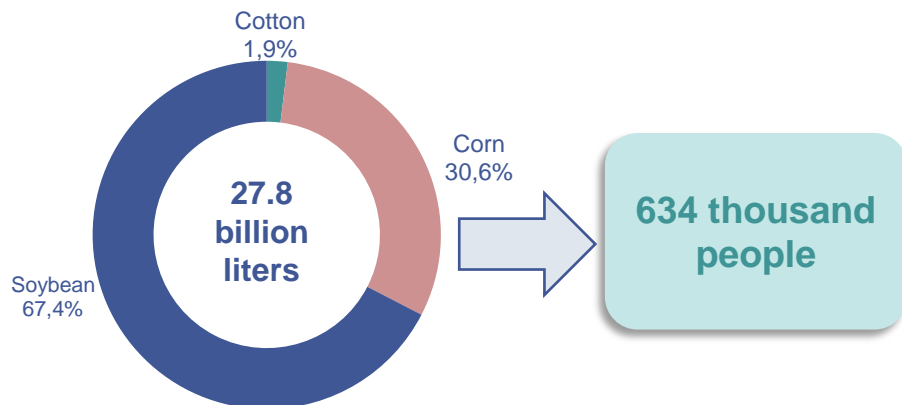
Economic Benefits, by segment



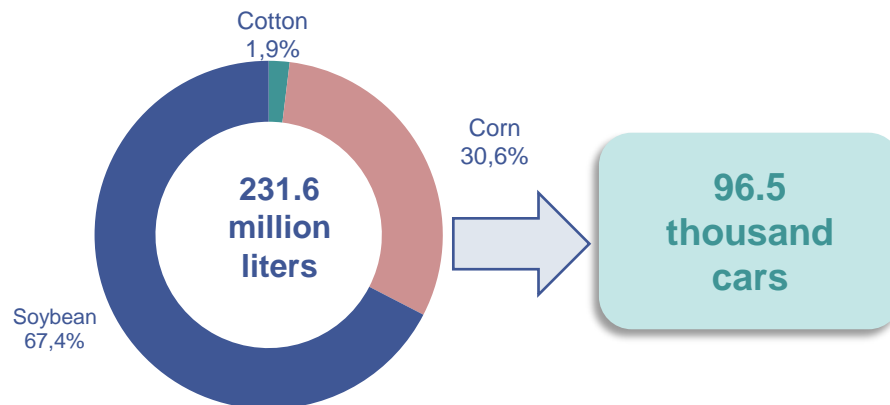
Fonte: CÉLERES® | Valores em bilhões de dólares

Environmental benefits from 1996/97 to 2011/12 are also relevant

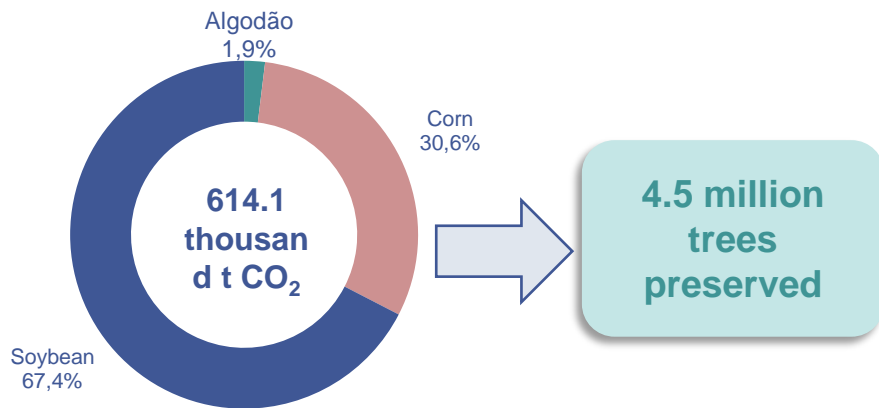
H₂O: Net benefit (billion liters): 1996/97 to 2011/12



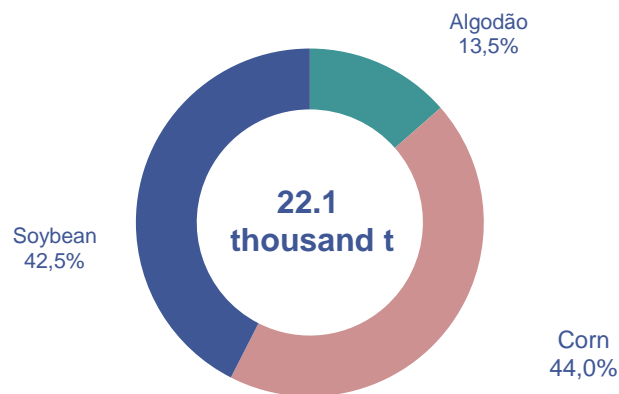
Diesel: Net benefit (million liters): 1996/97 to 2011/12



CO₂ equivalent: Net benefit (thousand t CO₂): 1996/97 to 2011/12



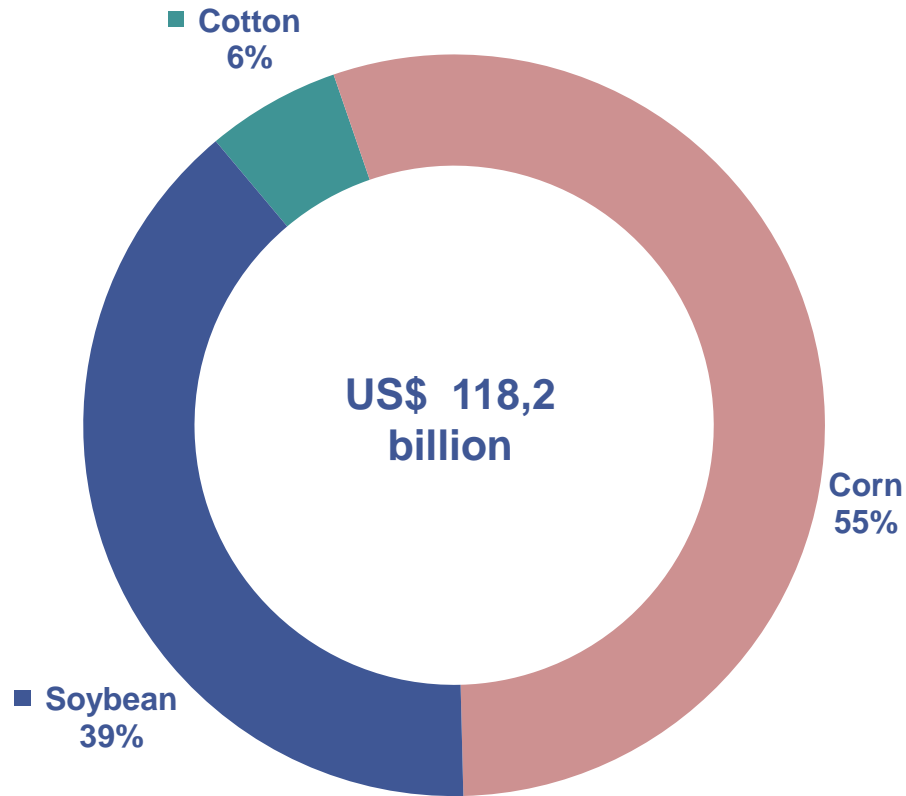
Active ingredient: Net benefit (thousand t de i.a.): 1996/97 to 2011/12



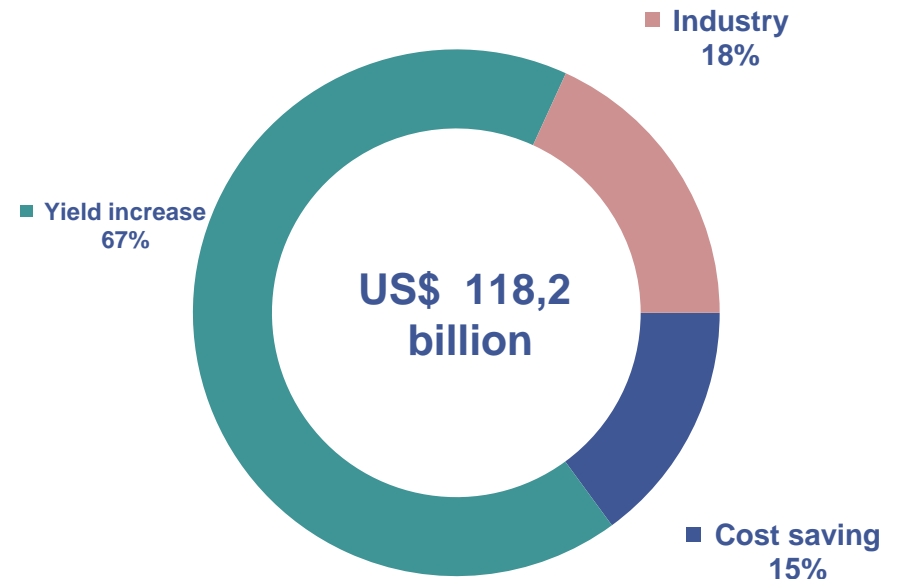
New traits and higher adoption rates will boost direct economic benefits to a remarkably level of US\$ 118.2 bilhões, through the next ten years

Direct benefits of Agri biotech adoption in Brazil : 2012/13 – 2021/22

Economic Benefits, by crop

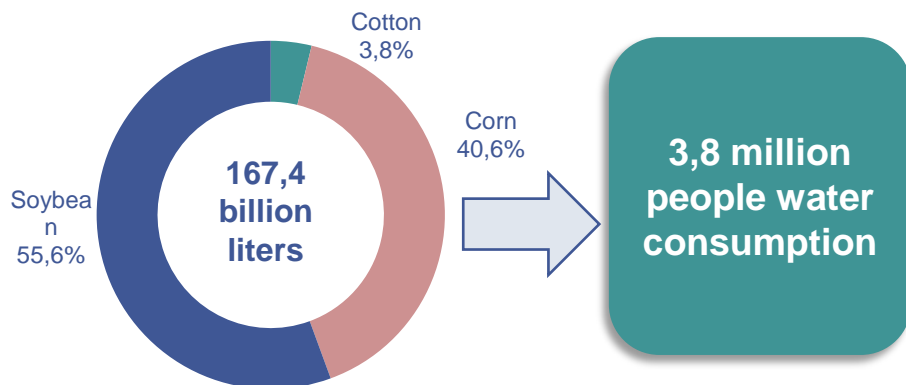


Economic Benefits, by segment

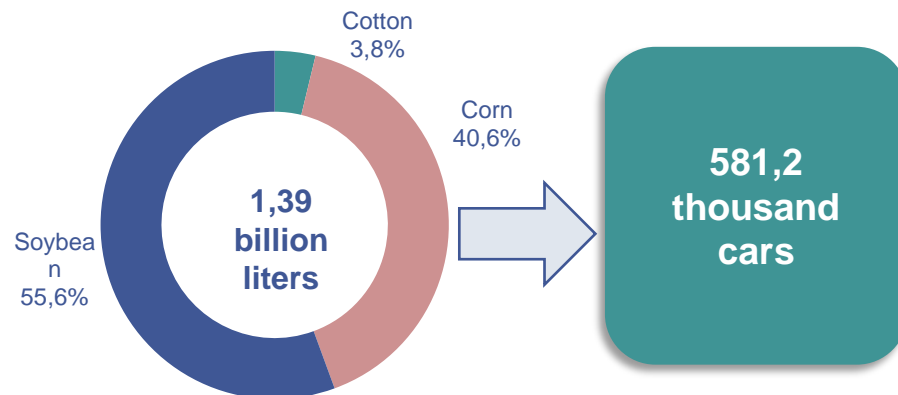


On top of economical benefits, direct environmental benefits brings additional advantage of Agri biotech adoption

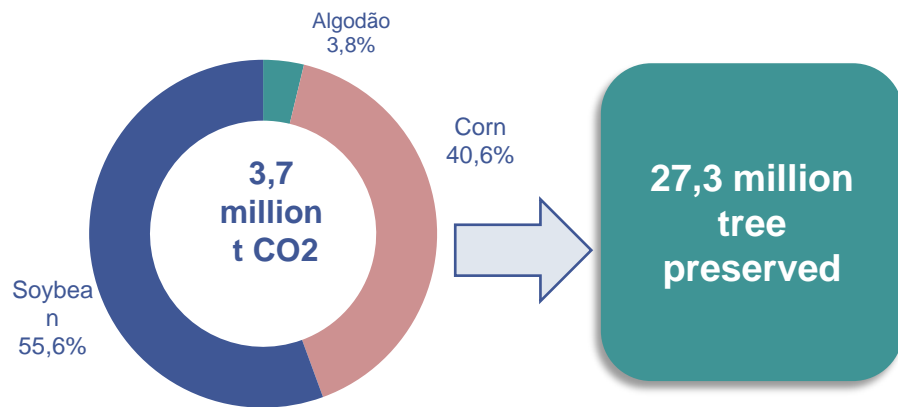
H₂O: Net benefit (billion liters): 2012/13 to 2021/22



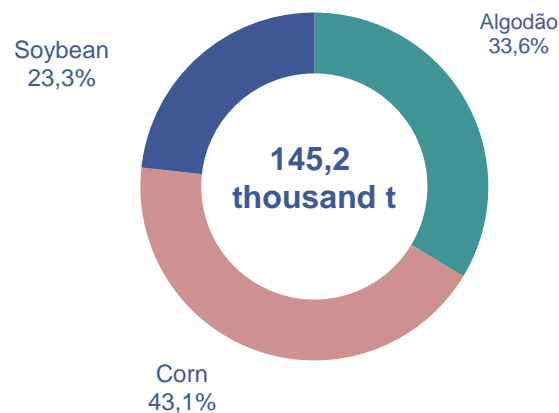
Diesel: Net benefit (million liters): 2012/13 a 2021/22



CO₂ equivalent: Net benefit (thousand t CO₂): 2012/13 to 2021/22



Active ingredient: Net benefit (thousand t de i.a.): 2012/13 to 2021/22

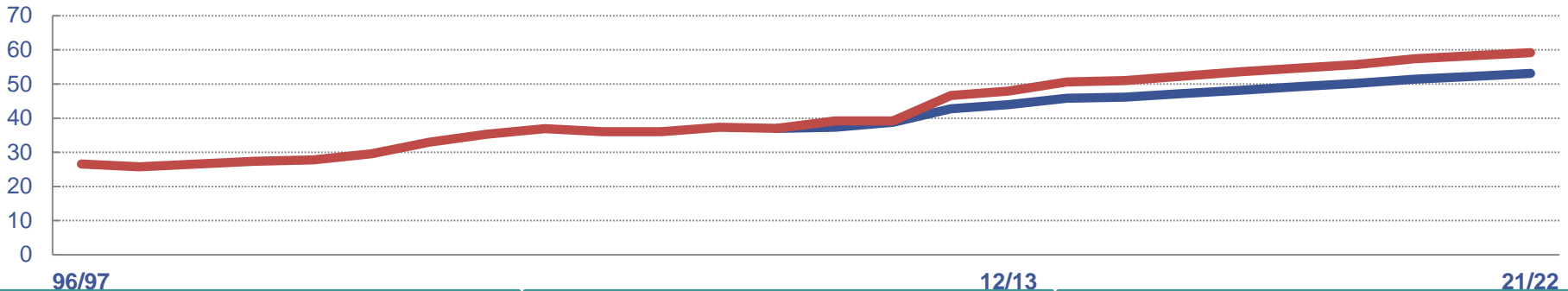


Fonte: CÉLERES® | CÉLERES AMBIENTAL®

Considering the three crops, the non adoption of Agri biotech would request an additional planted area of **53.1 million ha**, cumulative in the coming ten years

Scenarios with/without the adoption of Agri biotech crops in Brazil ^{1/}

— Area, WITH GM adoption — Area, WITHOUT GM adoption

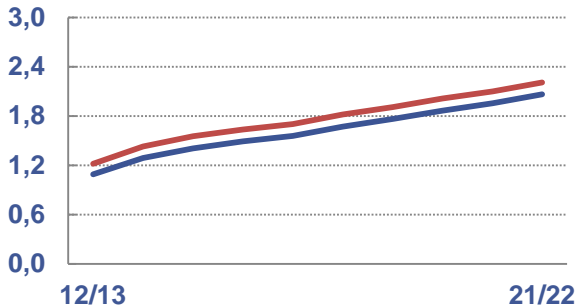


Cotton scenario

Corn scenario

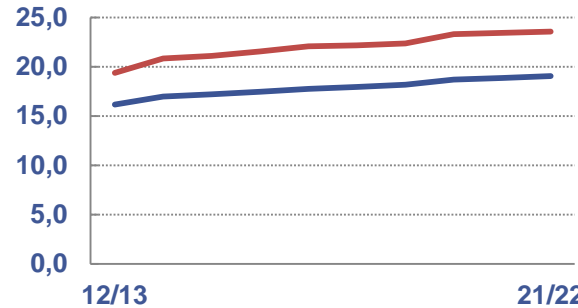
Soybean scenario

— Com adoção — Sem adoção



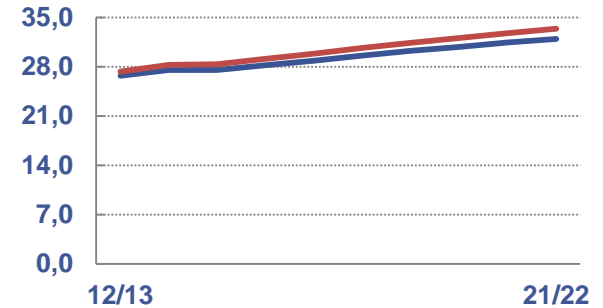
+ 1.4 million ha

— Com adoção — Sem adoção



+ 41.4 million ha

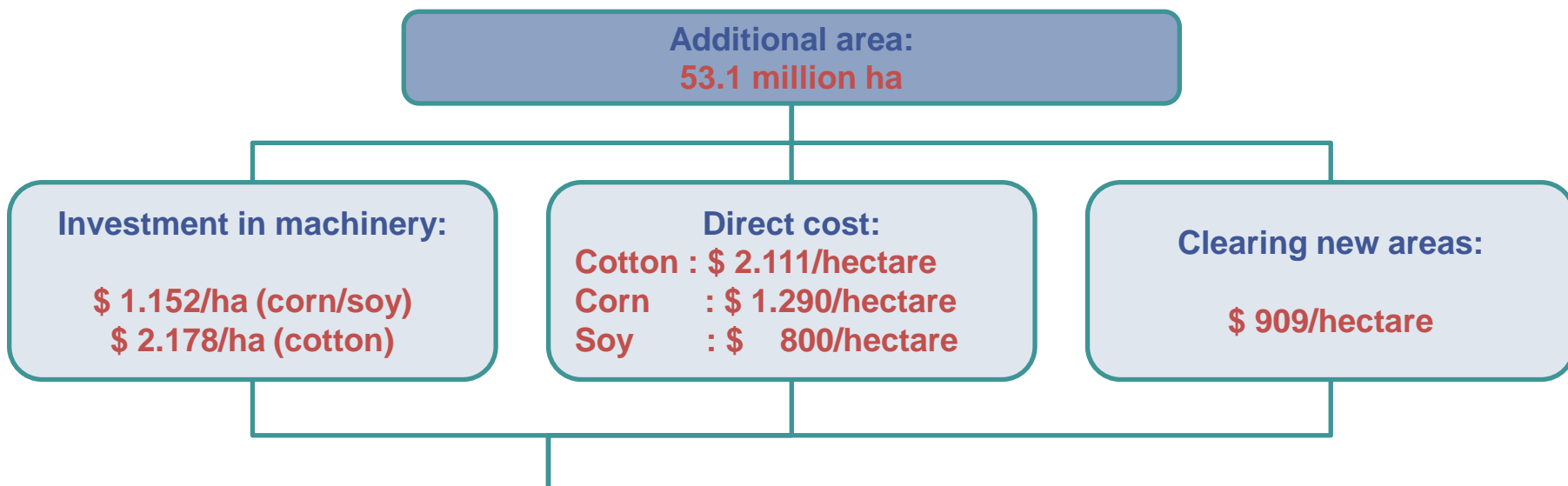
— Com adoção — Sem adoção



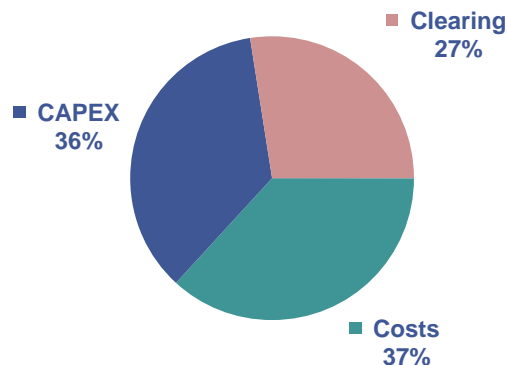
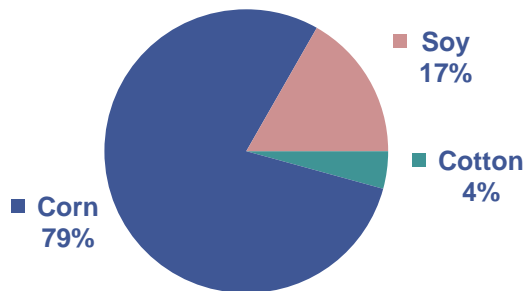
+ 10.3 million ha

Fonte: CÉLERES® | Valores em milhões de hectares | 1/ Considerando as culturas do algodão, milho e soja

A rápida adoção do milho transgênico, aliada à introdução da soja *stack* aumenta de forma expressiva, o custo de exploração da área adicional necessária, caso não se adote essa tecnologia



+ \$ 175,7 bilhões to fund the increasing area, for the next ten years



Environmental perspective

- GEE emissions
- Loss of biodiversity
- Soil losses
- Depleting natural resources

The intangible benefits of the agriculture technology

“A good sleep night: the main benefit from the biotechnology to myself”

Soybean and corn producer in Itumbiara, Goiás state, Brazil (August, 2009)



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