South American Agriculture and Farmers

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Acknowledgments

Farmers, consultants
Embrapa...
Universities
Private research
Industry
IRAC
Average annual rainfall

- SouthBR: 1786 mm/year
- Centerwest BR: 1553 mm/year
- Pampa Arg: 778 mm/year
- Corn belt USA: 780 mm/year
- Germany: 619 mm/year
- Ukraine: 434 mm/year
- Australia: 377 mm/year

Unit: Liter/m²/year
One kg soybean

- 60 g N
- 50 g PKSCaMgFeMoCu...
- 1000 liter water
For each ton of soybean a farmer manages 1000 m$^3$ water (1,000,000 liter)
Ethical responsibilities to provide food
Farm properties in Brazil

<table>
<thead>
<tr>
<th>Income class</th>
<th>Farms</th>
<th>Gross value</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-B</td>
<td>6</td>
<td>79</td>
<td>39</td>
</tr>
<tr>
<td>C</td>
<td>15</td>
<td>51</td>
<td>80</td>
</tr>
<tr>
<td>D-E1</td>
<td>28</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>E2</td>
<td>18</td>
<td>33</td>
<td></td>
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</tbody>
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IBGE 2006, FGV, CNA, DNGassen
Farmers and gross value

Brazil: 11.4% of Ag gross value
USA: 11.1% of Ag gross value
Europe: 13.9% of Ag gross value

11 to 14% farmers' share of Ag gross value
Soybean South BR & GAP

+120 kg/ha/year

GAP

South Brazil

Conab/DNGassen


t/ha
USA 9320 kg/ha

GAP South Brazil: 9315 kg/ha

South Brazil: 3654 kg/ha

USDA/Conab/DNGassen
Corn USA, BR & South Brazil

Tons/ha


Conab/DN榖assen
Corn production in Brasil

Total yield

First season

2nd season

Million tons


Conab/DNGassen
Adoption of GM crops in Brazil

% area

- Soybean RR
- Corn Bt
- Cotton Bt LL

Adoption of GM crops in Brazil:

- Soybean RR:
  - 2004: 21%
  - 2005: 23%
  - 2006: 40%
  - 2007: 57%
  - 2008: 60%
  - 2009: 66%
  - 2010: 72%
  - 2011: 76%
  - 2012: 84%
  - 2013: 87%
  - 2014: 90%
  - 2015: 93%

- Soybean Intacta:
  - 2004: 0%
  - 2005: 3%
  - 2006: 7%
  - 2007: 17%
  - 2008: 18%
  - 2009: 18%
  - 2010: 19%
  - 2011: 28%
  - 2012: 32%
  - 2013: 50%
  - 2014: 58%
  - 2015: 60%

- Cotton Bt LL:
  - 2004: 0%
  - 2005: 0%
  - 2006: 0%
  - 2007: 0%
  - 2008: 0%
  - 2009: 0%
  - 2010: 28%
  - 2011: 32%
  - 2012: 50%
  - 2013: 58%
  - 2014: 60%
  - 2015: 67%

Celeres/DNGassen
Costs of seeds & agrochemicals

R$/h

Corn seeds

Agrochemicals


Agros/DNGassen

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Corn and soybean seed costs

Corn
- Bt: 550 R$/h
- Non-Bt: 250 R$/h

Soybean
- Bt: 250 R$/h
- Non-Bt: 80 R$/h

DNGassen
Costs of Helicoverpa control

- Insecticide
  - 2013/14 H. armigera: R$70/h

- Bt soybean
  - R$80/h
Caterpillar in Soybean, West PR

Conte et al. 2014

Anticarsia gemmatalis. 62%
Chrysodeixis includens. 32%
Helicoverpa sp. 6%

Anticarsia gemmatalis.
Caterpillar in soybean, Nort PR

Conte et al. 2014

Anticarsia gemmatalis. 53%
Chrysodeixis includens. 45%
Helicoverpa sp.. 2%

Anticarsia gemmatalis. 53%

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Convencional Soja Bt
Convencional  Bt soybean

Anticarsia gemmatalis  Spodoptera cosmioides
Chrysodeixis includens  Spodoptera eridaniae
Helicoverpa armigera  Spodoptera frugipperda
Heliothis virescens
Helicoverpa gelotopoeon
Helicoverpa zea
Epinotia aporema
Omiodes indicata
Elasmopopalpus lignosellus
New pests on soybean?
Corn refuge area?
- 6% seed no Bt
- Less then 1%
Corn Bt refuge

- US$ 60.00/ha Bt seed
- 10% refuge

50% plants with damage, 30% yield loss: 1.5% total area.

7 tons/ha: 105 kg/ha: 12 US$
10 tons/ha: 150 kg/ha: 16 US$
Farmers conclusion

- New technology is there
- I am paying for it
- It isn't my problem
- Science, consultants, seed industry should solve it.
“Seed industry is promising endless biotechnologies that will be able to solve numerous farmer problems: weeds, insects, quality, drought, low lever nutrients...
Science consensus

Continuosing use of the same, crop, variety or chemical, resistance is inevitable

However it can be managed

Omoto & Maia
"There is no technology able to survive natural selection"
“There is no biotechnology able to extract nutrients or water if that are not in the soil...”
Scientists and Farmers

Scientists need good problems.
Farmers need good solutions.

Scientist recommendation, directly to farmers, usually causes paranoia.
Science & knowledge

- Private: seeds, genetics, fertilizers, machinery, agrochemicals, grains, food industry, precision agriculture...
Science & knowledge

- Public science: no taxonomists, no population dynamics, no resistance monitoring, few basic science, regulation is for environment and health.
Science & knowledge

- Two Ministries for Agriculture:
  - MAPA (Ministério da Agricultura…)
  - MDA (Ministério do Desenvolvimento Agrário)
Corn & Soybean

- New farmer: Agronomy Schools, new interest for ag.

- Past: if you don’t study, you are going to stay in farm.

- Future: if you want to farm, go to study.
Argentine soybean

- Brazil against OGM 2007
- Illegal use of RR soybean
- Arg. high soil fertility
- Arg. few pests & diseases
- Time for genetic studies
Brazil Tropical Ag

- Intensive biology
- New pests and diseases
- Agrochemicals
- Ants, rust, root diseases...
- Aphids... “r” strategists
Pousio é crime
520 thousand seeds/plant

182 achenes/capitulum (head)
Taxa de resistência (TR) de populações do percevejo *Euschistus heros*, PR, SP e MS

Safrinha: What to say?
Pest challenges

- Monocultures extensive
- Monogenetic (cultivars)
- Low agrochemical costs
- Pest resistance to chemicals
- New pests, knowledge, ethics, market rules...
Legal spraying
Label doses?
Agronomic prescription?
Tank mixtures?
Sprayer’s license?
What is the cost of consultancy after losing 1,000 kg/ha by mistakes?
What is the cost of losing a technology by mistakes?
Sustainable Agriculture

It is like sharing pigs: too much yelling for too little wool.

Brazilian popular saying
“If your only tool is a hammer then every problem looks like a nail”

“What can I spray?”
Profitability is proportional to knowledge applied per hectare.
Understand the plant biology, the population dynamics of pests, diseases and weeds and manage the crop health.
Ethical responsibilities to produce food
Obrigado!

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