Extension of the benefits of agricultural biotechnology in Brazil and future challenges

BIO Latin America Conference – Oct., 2016

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Overview of the adoption of agricultural biotechnology in Brazil
Spray comparison of pesticides in soybean, corn and cotton by technology

Number of entries for pesticides sprays in soybean (2014/15):

- BA: 10.3
- GO: 9.5
- MG: 5.9
- MS: 5.3
- MT: 5.5
- TH: 5.5
- PR: 4.4
- RS: 5.7
- Brazil: 6.1

Number of entries for pesticides sprays in corn, Winter (2014/15):

- BA: 3.2
- GO: 4.0
- MG: 4.1
- MS: 4.4
- MT: 4.0
- TH: 3.8
- PR: 3.5
- RS: 3.5
- Brazil: 3.2

Number of entries for pesticides sprays in cotton (2014/15):

- BA: 4.8
- GO: 4.0
- MG: 5.5
- MS: 5.3
- MT: 5.9
- TH: 5.5
- PR: 4.8
- RS: 4.0
- Brazil: 5.9

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Evolution of the economic benefits generated by biotechnology in the past and projected (US$ billion)

- **Accumulated for the last 19 years**: $32.9 billion
- **Ten years forecast**: $66.1 billion

Source: CÉLERES® | Agronomic, economic and environmental benefits of agricultural biotechnology in Brazil
Benefits already achieved thanks to the introduction of biotechnology in agriculture in Brazil, projections and legal support for the adoption of transgenic events in the country

For the last 18 years, Brazilian farmers generated significant environmental benefits with biotechnology adoption. Even greater benefits are expected for the next ten years, especially when considering the country's potential for expanding area.

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water</strong></td>
<td>49.1 bl.</td>
<td>113.0 bl.</td>
</tr>
<tr>
<td><strong>Diesel</strong></td>
<td>409.5 ml.</td>
<td>943 ml.</td>
</tr>
<tr>
<td><strong>CO₂</strong></td>
<td>1.1 m. e.</td>
<td>2.5 m. e.</td>
</tr>
<tr>
<td><strong>Chemicals</strong></td>
<td>66.1 k. t</td>
<td>232.5 k. t</td>
</tr>
</tbody>
</table>

Brazilian farmers generated significant environmental benefits with biotechnology adoption, with much of this made possible by a robust and effective regulatory framework that gives Brazil a prominent position in Latin America when it comes to the historical, institutional, regulatory and technical aspects of the legislation that approves GMOs in the country.

Much of this was made possible by a robust and effective regulatory framework that gives Brazil a prominent position in Latin America when it comes to the historical, institutional, regulatory and technical aspects of the legislation that approves GMOs in the country.

<table>
<thead>
<tr>
<th>Country</th>
<th>Historical</th>
<th>Regulatory</th>
<th>Technical</th>
<th>Final evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>28,1</td>
<td>24,9</td>
<td>28,9</td>
<td>8,8</td>
</tr>
<tr>
<td>Argentina</td>
<td>78,3</td>
<td>72,2</td>
<td>25,2</td>
<td>9,0</td>
</tr>
<tr>
<td>Uruguay</td>
<td>72,2</td>
<td>19,4</td>
<td>23,2</td>
<td>7,9</td>
</tr>
<tr>
<td>Paraguay</td>
<td>69,8</td>
<td>16,5</td>
<td>26,5</td>
<td>7,5</td>
</tr>
<tr>
<td>Colombia</td>
<td>77,8</td>
<td>22,0</td>
<td>23,0</td>
<td>7,8</td>
</tr>
<tr>
<td>Mexico</td>
<td>68,0</td>
<td>24,7</td>
<td>15,5</td>
<td>6,7</td>
</tr>
</tbody>
</table>

Classification of countries by the regulatory framework that assesses GMOs in Latin America (base 100)
The Brazilian modern regulatory framework allowed a functional system for ag biotech approvals

Evolution of protocols registrations and approvals of ag biotech traits in Brazil

The average time required for the approval of a transgenic product fell from 22 months in the past 15 years to about 16 months at present, thanks to the excellent structure and evaluation system of the Brazilian agency CTNBio and, in addition, events that have happened in recent years that accelerated the assessment process of GMOs, such as the approval of the Biosafety Law in 2005.
Brazil is a country of significant agricultural production, one of the only that simultaneously live productive consolidation and expansion of agricultural frontier. The characteristic climate, tropical, provides the prevalence of organic living matter and that is constantly changing. A great biodiversity can be observed, with very disparate regional differences, and soils that, despite sharing borders, also differ significantly.

These are some of the variables that, combined, make up the great challenge that is to develop products that perform with excellence in each of the different Brazilian regions.
Diversity of technological levels existing in Brazil portrayed in yield

- The overlap of different biomes, climate and soils, as well as historical factors of the Brazilian agriculture, culminate in a large soybean yield range, and that does not follow regional standards;
- The same is observed for corn, but with greater regional concentration and a greater number of states with excellent yield levels. It is clear, however, that the cereal reality is made of extremes in Brazil: a North/Northeast of poor production conditions while the Middle/South concentrates properties with the best performances in the country.

Source: CÉLERES®
Conclusion
To meet these different realities, what should we expect from law makers and from the market so that the continuity and innovation of the Brazilian agricultural biotechnology is perpetuated?
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