BRAZILIAN LOW CARBON AGRICULTURE PLAN: update

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Brazilian Low Carbon Agriculture Plan

Recent key achievements: Low-carbon agriculture in Brazil

<table>
<thead>
<tr>
<th>Technology / Process</th>
<th>Committment / (land use increase)</th>
<th>Mitigation Potential (Million Mg CO₂ eq)</th>
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</thead>
<tbody>
<tr>
<td>Pasture Recovery (1)</td>
<td>15 million hectares</td>
<td>83 to 104</td>
</tr>
<tr>
<td>Integration Crop-Livestock-Forest (2)</td>
<td>4 million hectares</td>
<td>18 to 22</td>
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<tr>
<td>No Tillage System (3)</td>
<td>8 million hectares</td>
<td>16 to 20</td>
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<tr>
<td>Biological Nitrogen Fixation (4)</td>
<td>5.5 million hectares</td>
<td>10</td>
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<tr>
<td>Planted Forests (5)</td>
<td>3 million hectares</td>
<td>-</td>
</tr>
<tr>
<td>Manure Treatment (6)</td>
<td>4.4 million m3</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>-</strong></td>
<td><strong>133.9 to 162.9</strong></td>
</tr>
</tbody>
</table>

1. Correct management and use of fertilizer. Mitigation potential considered was 3.79 Mg CO₂eq ha⁻¹ year⁻¹
2. Including Agroforestry Systems. Mitigation potential considered was 3.79 Mg CO₂eq ha⁻¹ year⁻¹
3. Mitigation potential considered was 1.83 Mg CO₂eq ha⁻¹ year⁻¹
4. Mitigation potential considered was 1.83 Mg CO₂eq ha⁻¹ year⁻¹
5. Not considered
6. Mitigation potential considered was 1.56 Mg CO₂eq m³
Crop-Livestock-Forest Integrated Systems

- CO₂
- CH₄
- Forest Biomass
- Enteric Fermentation
- Recovered pastureland & Soil C accumulation at depth
Soil C Dynamics

Fig. 3: A schematic of the soil C dynamics upon conversion from a natural to agricultural ecosystem, and subsequent adoption of recommended management practices (RMPs). In most cases, the maximum potential equals the magnitude of historic C loss. Only in some soil-specific situations, the adoption of RMPs can increase SOC pool above that of the natural system. An example of this is acid savanna soils of South America (Llanos, Cerrados) where alleviation of soil-related constraints can drastically enhance the SOC pool.

Lal, R. 2008 Conference Soil and Climate Change, Brussels, June, 12, 2008
Animal welfare = thermal comfort

Note: Please believe us because the cows are not stuck with chains in the trees!!!
Crop-Livestock-Forest Integrated Systems

Animal welfare = thermal comfort
Brazilian Low Carbon Agriculture Plan

Recent key achievements: Network to foster and promote iCL-F systems ("Rede de Fomento à iIPF")

- Public-private partnership;
- Established in 2012;
- 97 units for demonstrating the technology;
- 19 Embrapa’s research units involved;
- From lab to farms;

November 2016

http://redeilpf.com.br
Multi-institutional Low Carbon Agriculture Lab Monitoring Agricultural GHG Emissions- Platform ABC (Coordinated by Embrapa)

Embrapa Environment- Jaguariúna, SP, Brazil
Adoption of Integrated Crop-Livestock-Forest (CLF) Systems in Brazil - 2016

Evolution of adoption:
2005-2010 – 3.6 million ha
2010-2015 – 6 million ha

Evolution of mitigation:
2005-2010 – 13.3 million t CO$_2$ eq
2010-2015 – 21.8 million t CO$_2$ eq

Source: Low Carbon Agriculture Lab 2016
Extraordinary change within 10 years, with support from Embrapa and Extension Service, Mrs Marize Porto, a Farmer in Goiás State (Neotropical Savanna).

Integrated crop livestock forestry system

How to take a farm out of bankruptcy
In the State of Rio Grande do Sul, Mr. Ivonei Librelotto has adopted integrated crop-livestock system.

Double-purpose wheat, which allows for grazing and grain production, is one of the pillars of the system, implemented nine years ago. A pioneer in the use of the wheat cultivar, the farm is a model unit of Embrapa Wheat.
Final Remarks

- Low Carbon Agriculture Plan- strong connection with GRA Flagships Soil Carbon Sequestration, Enteric Fermentation and Inventory

- Can be very useful to future activities of eventual GRA Flagship on Circularity in Climate Smart Food Production (monitoring and data in all country, including at farm level)

- Multi-institutional Low Carbon Agriculture Lab to Monitoring Agricultural GHG Emissions in Brazil Platform ABC- data base, remote sensing for land use and management changes....- example to other countries on how to make a national monitoring of Government Plan – Coordinated by Embrapa, with Executive Board with members from other public institutions (including Ministry of Environment), private institutions (including banks) and no-governmental organizations – Support to GRA Inventory Flagship

- Brazil and Embrapa- totally open to international cooperation including CRG member countries.