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Inventorying greenhouse gas emission due to the harvest practices in sugarcane areas of South Central, Brazil

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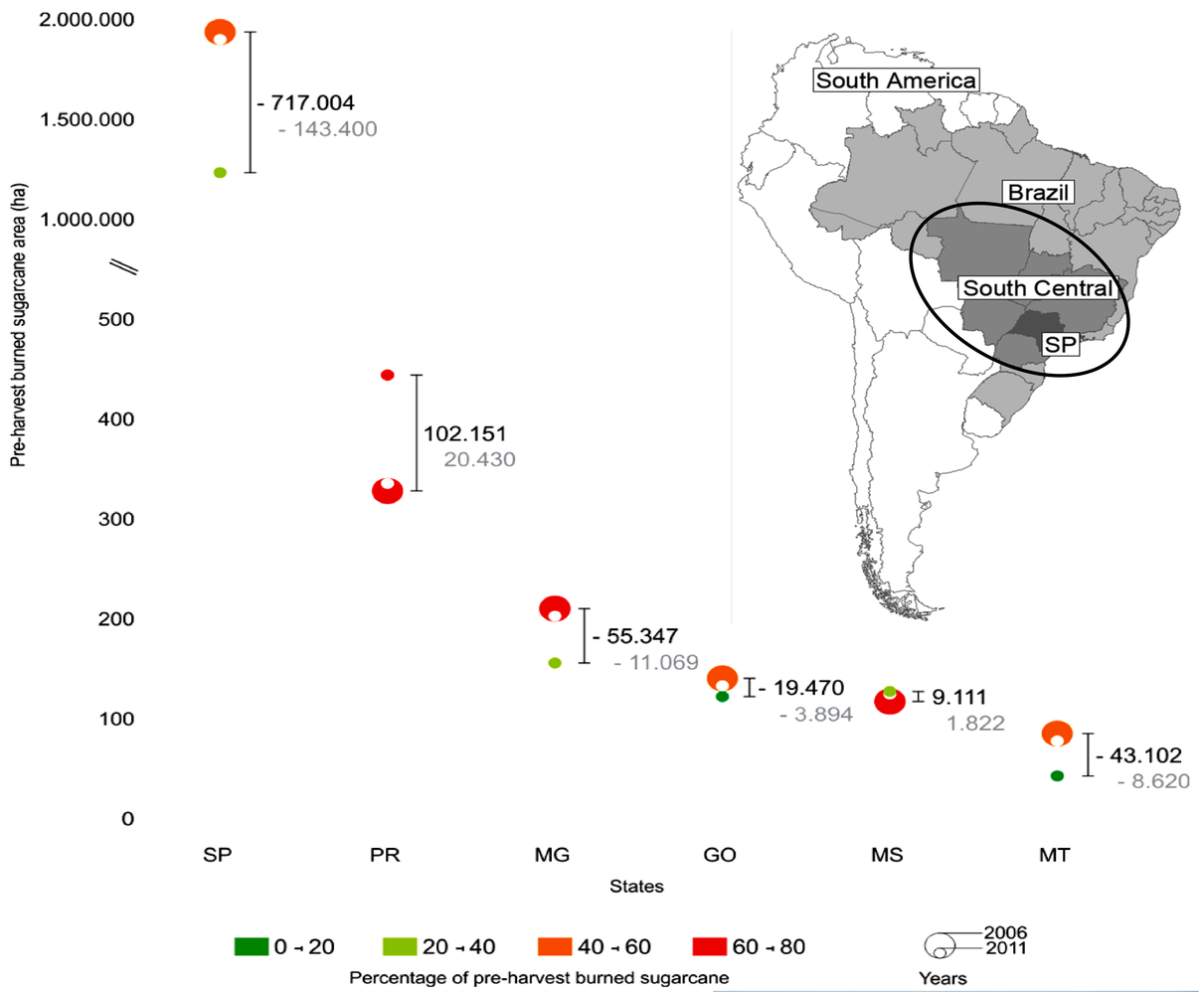
Introduction

• Increasing biofuel's use is an alternative to fossil fuels, which helps to reduce greenhouse gas (GHG) emissions to atmosphere. Sugarcane ethanol has proved to promote up to 90% of GHG emission reduction compared to gasoline (IEA, 2007). However, land management, especially the ones associated with harvest practices, could influence the GHG emission related to the sugarcane in its agricultural phase. This study estimates the GHG emissions due to sugarcane harvest practices, contrasting burned and green harvest, in sugarcane areas of South Central region, Brazil.

Materials and Methods

• Considering the period from year 2006 to 2011, estimates were based on IPCC (2006) methodologies. The GHG emissions were associated with the following sources: i) sugarcane residue burning; ii) N_2O emissions from sugarcane residues left on soils after green harvest; and iii) emission from diesel consumption by harvesting operations. The mapping of sugarcane harvest type was performed using MODIS satellite data acquired from April to December of each year. Figure 1 presents the total and percentage of pre-harvest burned sugarcane area for each of Brazilian states, and its change from years 2006 to 2011.

Figure 1. Area and percentage of pre-harvest burned sugarcane (ha) during the 2006-2011 period, according to each state of South Central region in Brazil.



Results and Discussion

• The total sugarcane areas available for harvest increased from 4.6 to 7.7 Mha during the years 2006-2011, corresponding to an increase of 67% in this period (Figure 2). On the other hand, the total emissions related to the harvest practices raise only 33%, from 5.8 to 7.7 Mton CO_2eq, respectively. Considering total GHG emission per area, our estimates point out to a reduction of more than 20% in the studied period, from 1.25 to 0.99 ton CO_2eq ha^{-1} (Figure 2).

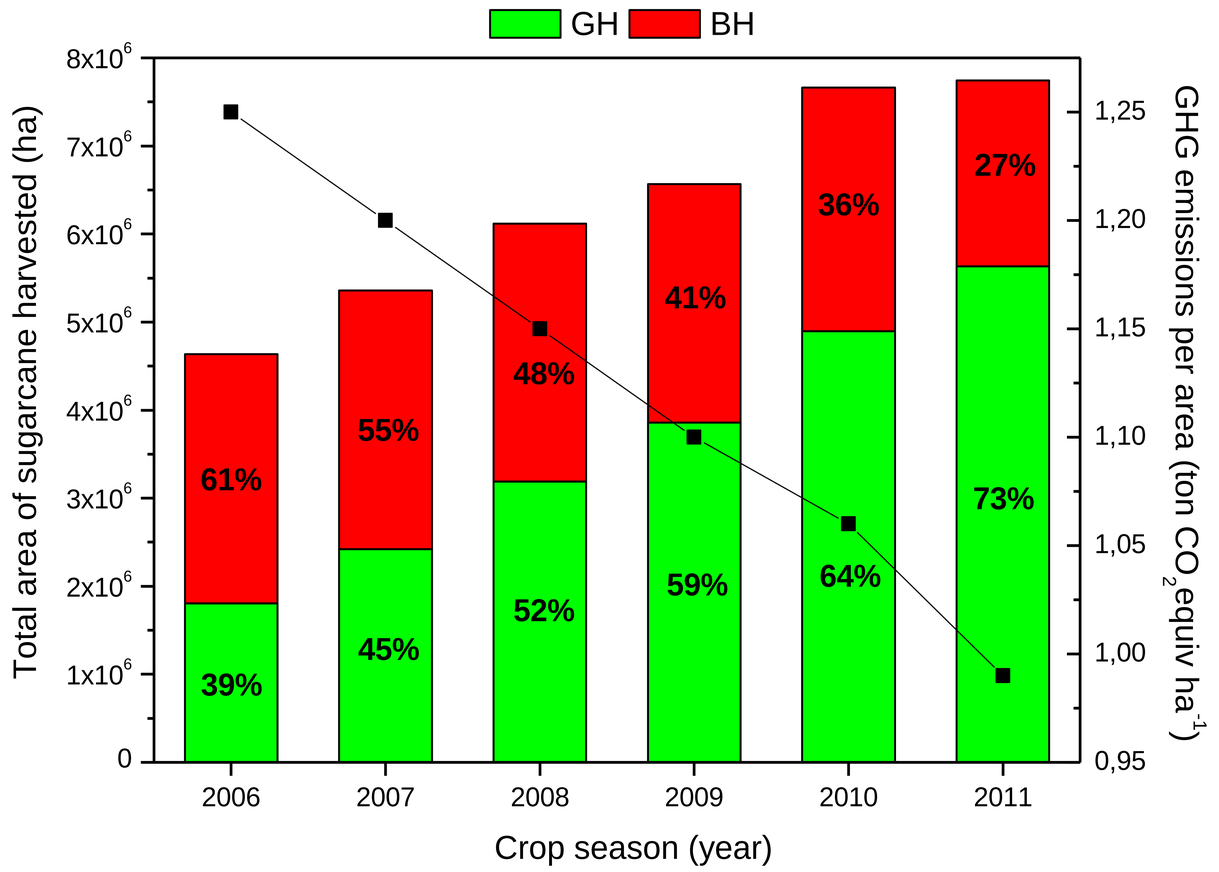


Figure 2. Total area of sugarcane harvested (ha) and greenhouse gas (GHG) emissions per area (ton CO_2equiv ha^{-1}) during the period of 2006 until 2011.

Conclusion

The GHG emission reduction is due to the conversion from burned to green harvest, in which the contribution of pre-harvest burning in total sugarcane area decreased from 61 to 27%. This study suggests that ethanol production from sugarcane crop could easily be more sustainable if non-burning practices would be implemented in all of production area.

References

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