INITIATIVE ON
Livestock and Climate

Can BNI-Tropical Forage Bring Double Benefits for Climate Change Mitigation? - A Case Study in South American Cattle Grazing

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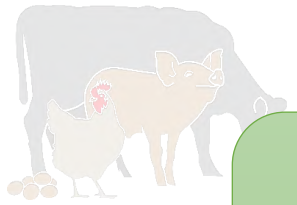
Why are Livestock and Forages Important: The Facts



17

The estim
lives

*(including cattl
and about a d
guinea f*

About **two-thirds** of
the world's total agricultural area

The value of livestock as
a global asset reaches

USD3.1
ON

for some
illion jobs

How can we reduce the environmental footprint in cattle production systems?

~200 MHa

In **America Latina alone**, have been **degraded** by **overgrazing** and other **unsustainable** production practices.

livestock to climate change,
which is about

8.1 billion tCO_2eq

50% Of total agricultural emissions

15% of all human-induced greenhouse gas emission

These includes emissions from **deforestation** to make way to pastures

Peters et al., 2013

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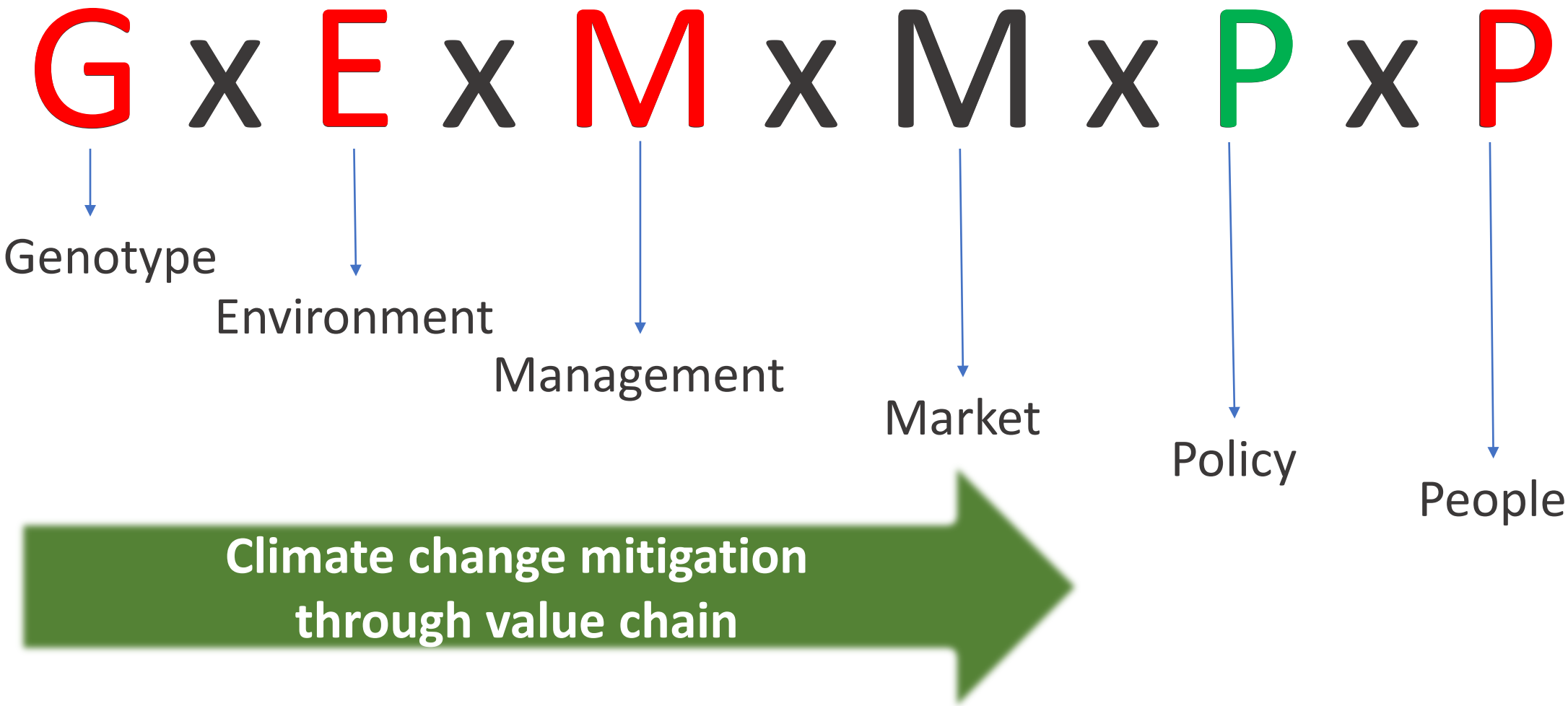
Sustainability in Agriculture: Complicated



Our Challenges and Strategies in R&D

Challenges: Can we develop **solutions** to **lower GHG emissions** and **actively remove carbon** from the atmosphere through cattle grazing at the farm level?

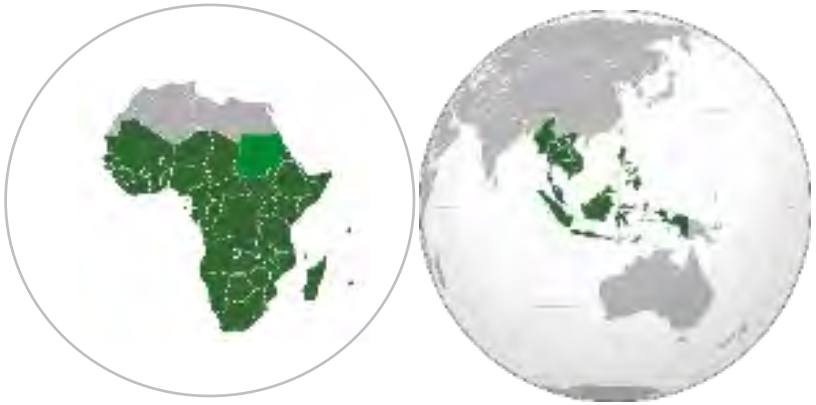
Strategies:

Genetic Mitigation **+ Agronomic** Mitigation

A Variety of Livestock Production Systems in the Global South

Latin America & the Caribbean

Permanent grasslands



Sub-Saharan Africa & Southeast Asia

photo credit: ILRI/Alan Duncan

Cut and carry

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Genetic mitigation

Agrobiodiversity – the Key to Food Security, Climate Adaptation, Mitigation and Resilience

37,987
Bean accessions

6,643
Cassava accessions

44,000
Tropical forage accessions

Alliance germplasm (gene) bank:
Conserving the world's largest collections of beans, cassava and tropical forages

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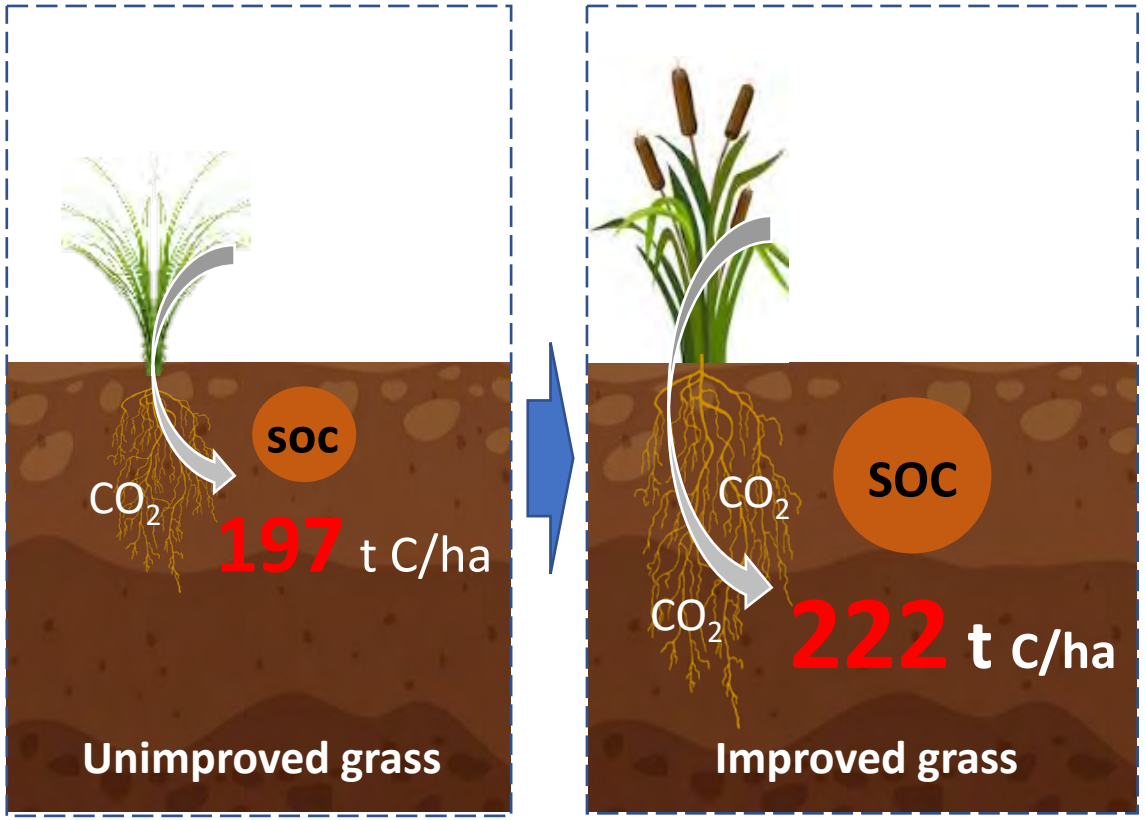
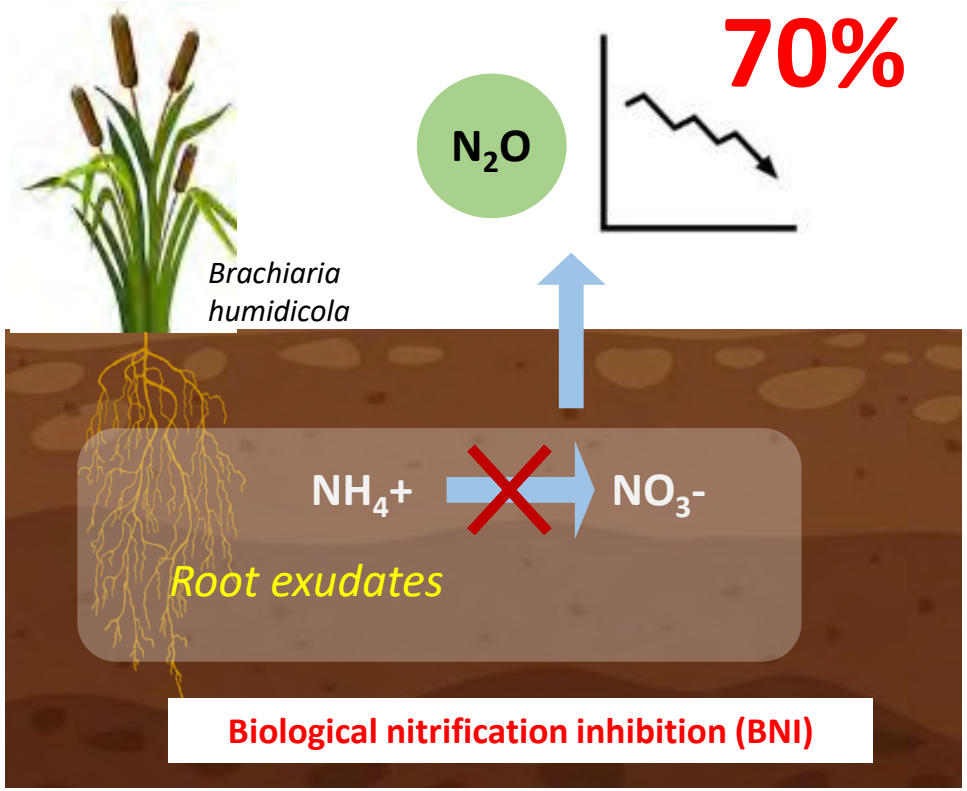
Super Grass with Two Benefits for Climate Change Mitigation

Carbon sequestration into soil



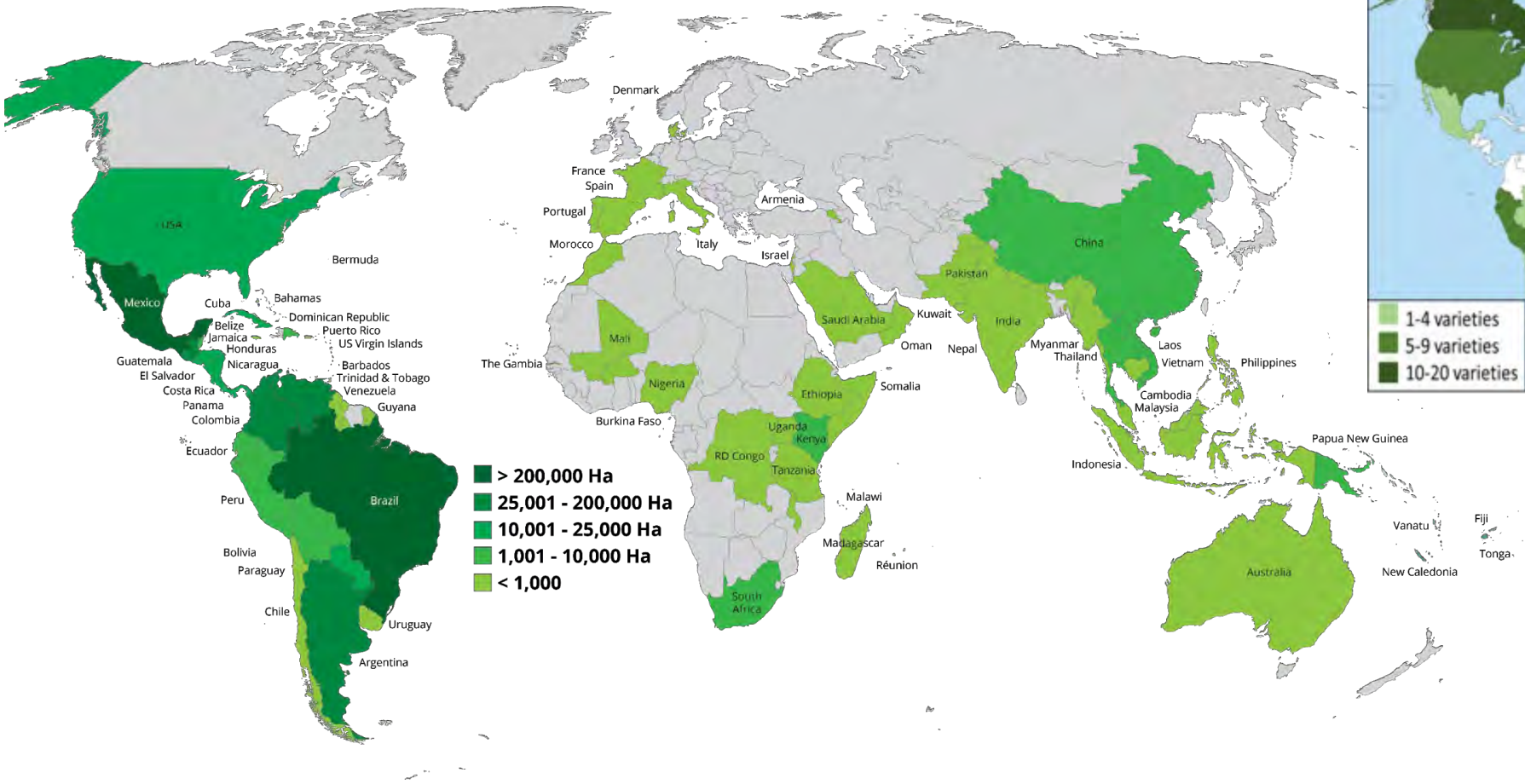
Fisher *et al*. 1994. Letters to Nature

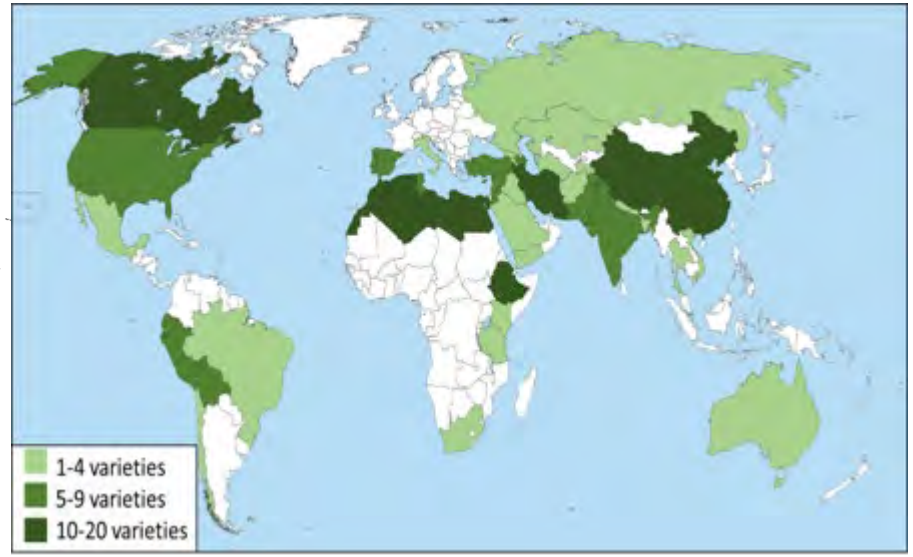
Lower N_2O emissions



Subbarao *et al*. 2009. PNAS

Scaling: Global Uptake of CGIAR Brachiaria: Rapid Growth in Latin America since 2001, Expanding in East Africa Since 2018

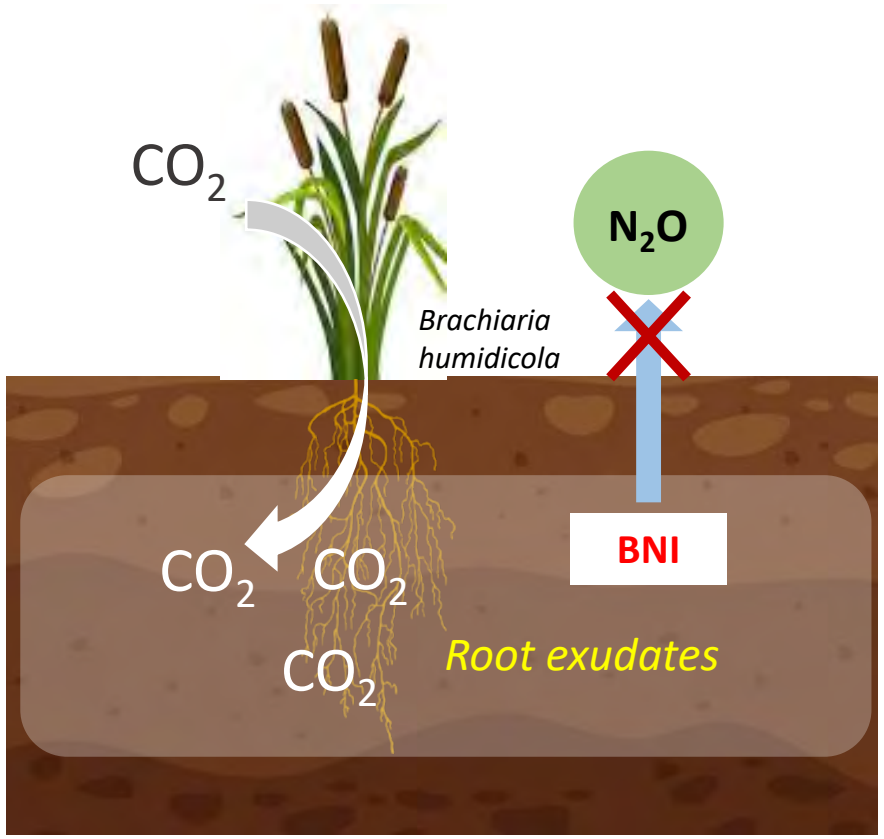




How to Best Use Improved Grasses for Measurable Impacts?

Genetic Mitigation

"Super grass"



G x **E** x **M**

\+ **Agronomic** Mitigation

Field Trial at CIAT HQ to Test Productive and Environmental Parameters with Grass-Legume Combinations

Agronomic mitigation

Treatments:

T1: *Brachiaria brizantha* cv Toledo.
T2: *Brachiaria brizantha* cv Toledo + *Canavalia brasiliensis.*
T3: *Brachiaria brizantha* cv Toledo + *Canavalia brasiliensis* + *Leucaena diversifolia.*
T4: *Brachiaria* hybrid cv Cayman.
T5: *Brachiaria* hybrid cv Cayman + *Canavalia brasiliensis.*
T6: *Brachiaria* hybrid cv Cayman + *Canavalia brasiliensis* + *Leucaena diversifolia.*

T1 T2 T3 T5 T4 T6
T3 T1 T2 T4 T6 T5
T2 T3 T1 T6 T5 T4

Better Agronomic Practices Matters for the Mitigation

Results

Experimental field

90%

reduction

10.6 ha

Naturalized pasture

3.1 ha

Brachiara humidicola

1.2 ha

Hybrid. Cayman + Canavalia

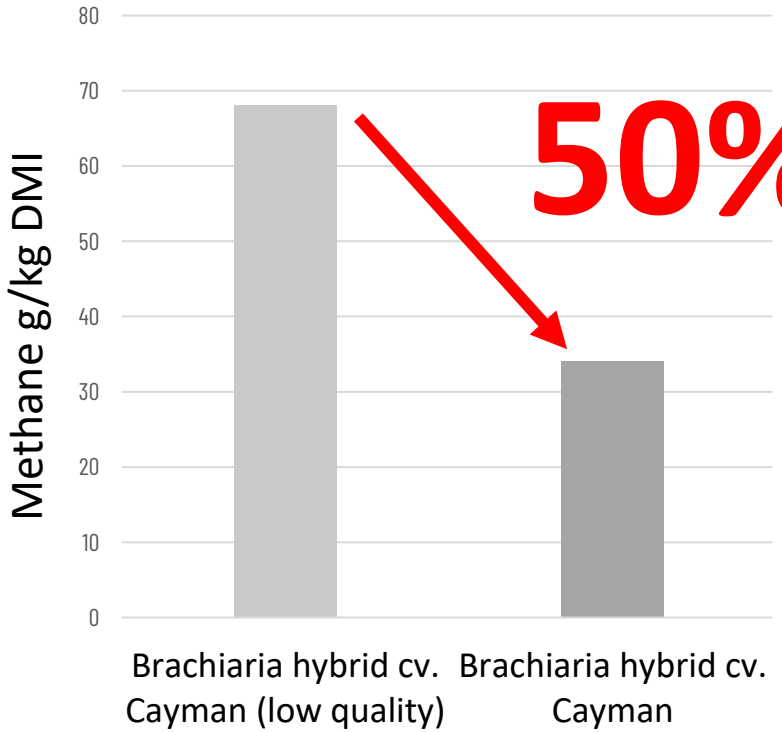
Projection of the area needed to produce **800kg/cattle live weight/year**

Implications

+

Grazing Management is Key to Enteric Methane Emission

***Brachiaria* hybrid cv. Cayman**



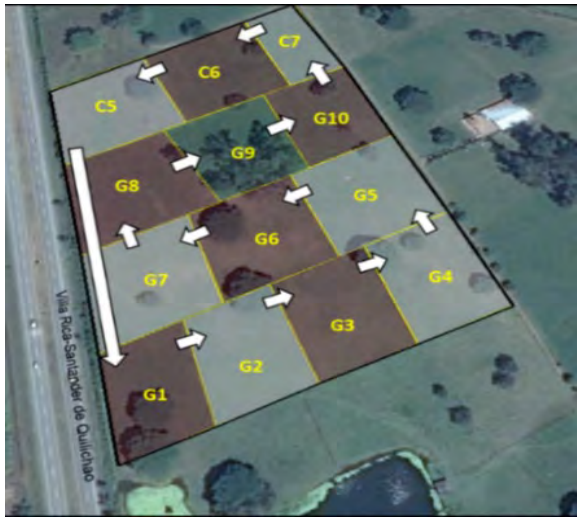
50% reduction

Gaviria *et al.* 2020. Front. Vet. Sci

Deployment of Solutions and Scaling Up at Farm Level

Target farms

MAFF project sites

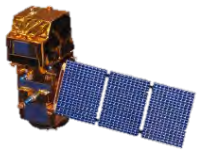


Campina farm
Plot size: 0.26 and 0.54 ha

Inputs

Remote sensing data

Drone



Satellite

Ground-truth data

Expected outputs

- Find **overgrazing plot/area**
- **Predict biomass** in each plot at a scale for the **best rotation schedule**
- **Effectively manage** grazing plots with **digital tools**

Data-driven grazing management

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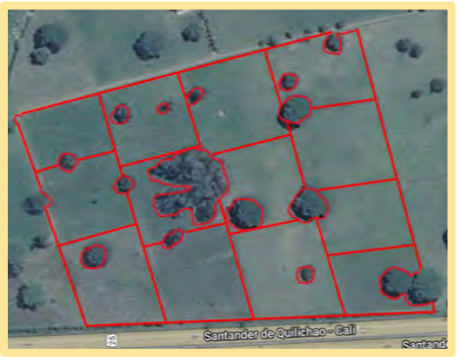
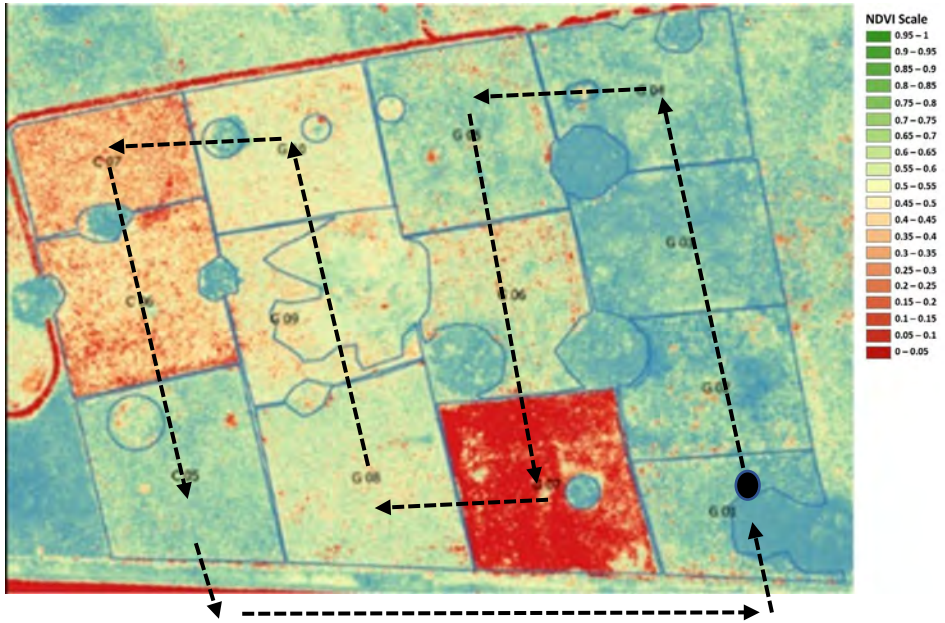
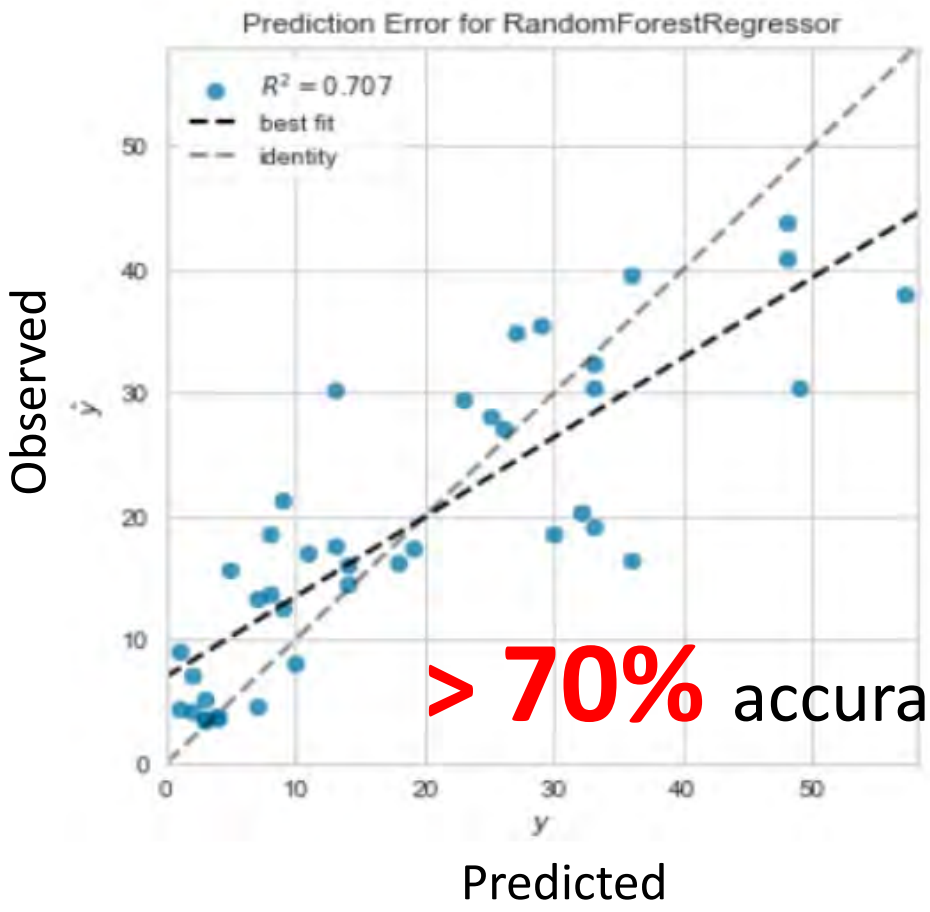
Biomass Prediction by AI Model for Precise Grazing Management



Vegetation index map
by drone data



Cattle grazing plots with rotation at Campina farm



Alvarez-Mendoza *et al.* 2022 Remote Sensing submitted

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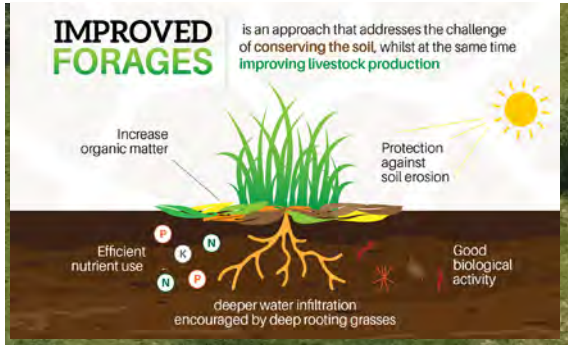
Best Mix Scenario for Productivity and Environment



High BNI Brachiaria hybrids
Treatments:

1)675
2)675 + *Centrosema molle*
3)679
4)679 + *Centrosema molle*
5)1149
6)1149 + *Centrosema mole*

6 treatments and 3 blocks

Concluding Remarks – Moving Forward

"**Green recovery**" in **ag-food systems** is paramount to achieving **net zero GHG emissions by 2050** while sustaining productivity

- ✓ Well-managed tropical forages can help intensify production in less area (**sustainable intensification**)
- ✓ Some improved grasses exhibit **BNI** abilities that increase NUE and **reduce nitrous oxide emissions**
- ✓ **Grazing management and productive grasslands** are crucial to **reducing emissions**

- ❑ **Inclusive agricultural value chain** to facilitate the **transformation**
- ❑ **Digital inclusion of youth** to create ag-food jobs in the green recovery

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Thank you!

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