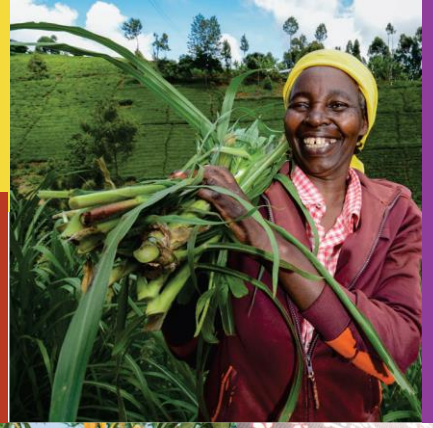

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CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

Rice Program

María Fernanda Álvarez

Rice program Leader

PhD. Genetics and Plant breeding

Crops for Nutrition and Health

Rice… grains to feed the world

- The most important food crop in the developing world and a staple food for more than half of the population in the world.
- Worldwide, more than 3.5 billion people depend on rice for more than 20% of their daily calorie intake.
- An additional 116 million tons of rice will be needed by 2035 to feed growing populations.
- Rice consumption is growing faster than any other commodity in Africa, because it is seen as a convenience food by the growing urban population.

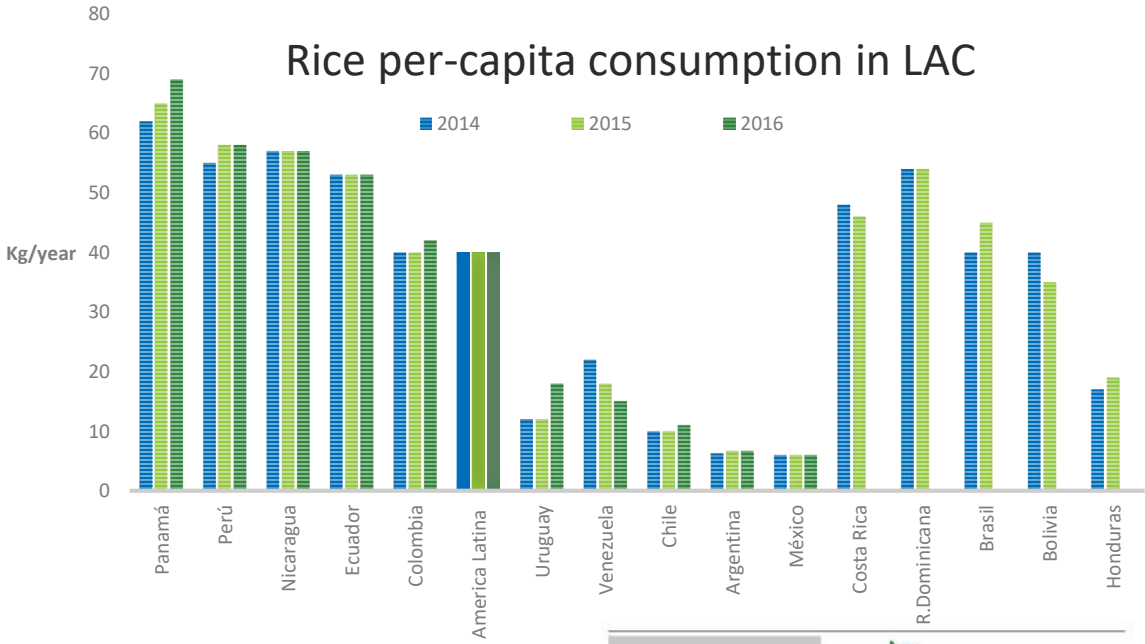
Rice in LAC

- High per/capita consumption up to 70 Kg/years
- Increasing urban population
- Rural poverty up to 45%
- The rice production and yield tripled in last 50 years
- 80% of the planted are under DRS

COVID-19 impact in LAC

The regional economy will contract 5,3 %

the poverty rate will increase in 4,4%



Source: Andrade, R. Labarta, R. 2017 – FLAR members survey

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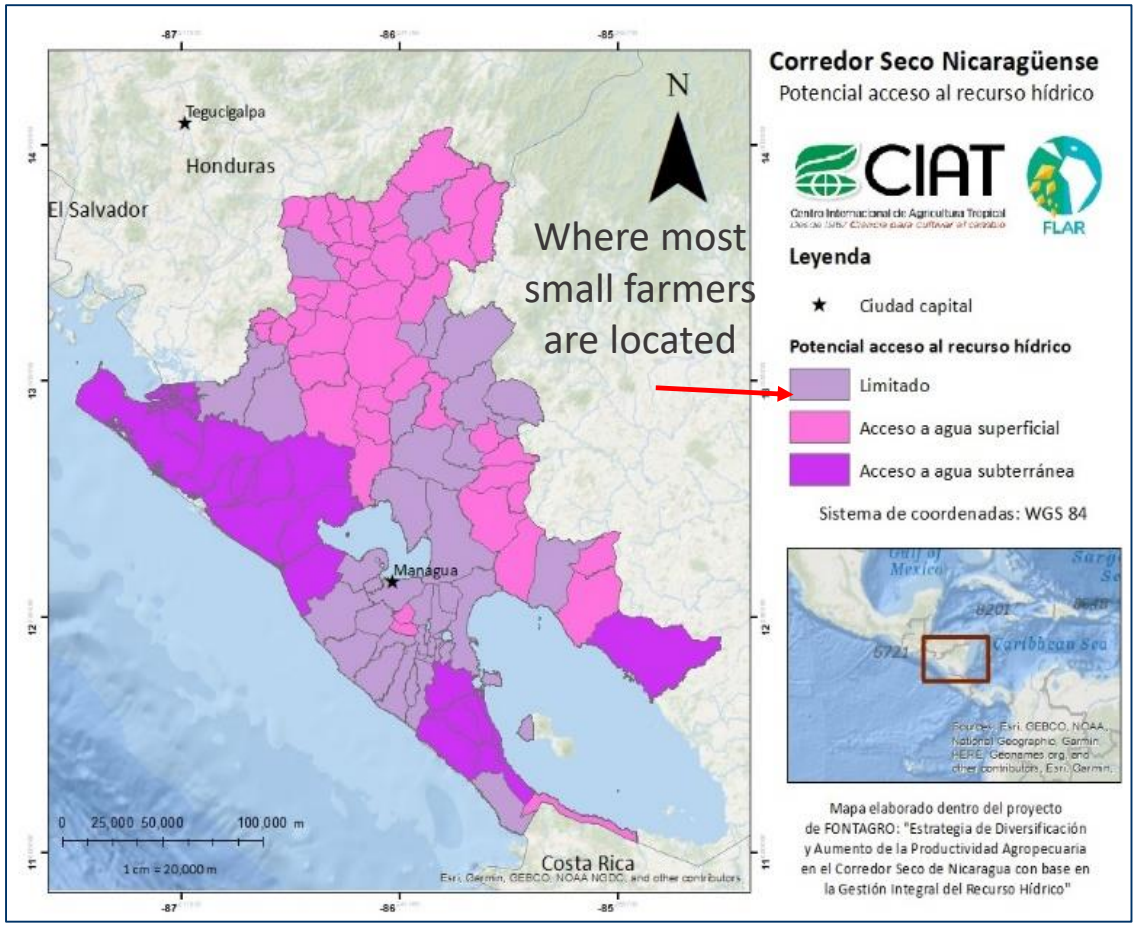
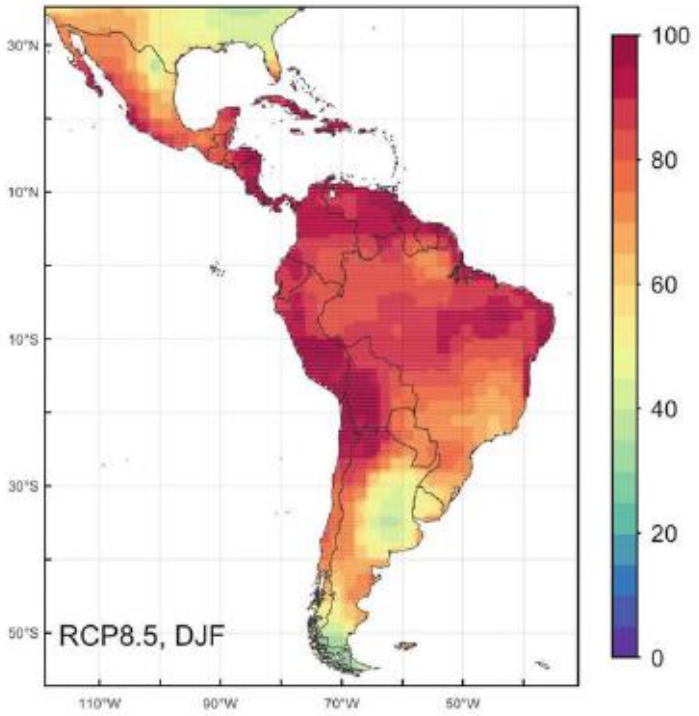
Accessing and managing water resources: an increasing challenge for agriculture in many LAC regions



How would be rice in LAC in a >2^{o} C world with higher CO_2 levels?



Turn down the heat: confronting the new climate normal. World Bank Group. 2014. ISBN: 978-1-4648-0437-3

SCIENCE ADVANCES | RESEARCH ARTICLE

ECOLOGY

Carbon dioxide (CO_2) levels this century will alter the protein, micronutrients, and vitamin content of rice grains with potential health consequences for the poorest rice-dependent countries

Chunwu Zhu,[1] Kazuhiko Kobayashi,[2] Irakli Loladze,[3] Jianguo Zhu,[1] Qian Jiang,[1] Xi Xu,[1] Gang Liu,[1] Saman Seneweera,[4] Kristie L. Ebi,[5] Adam Drewnowski,[6] Naomi K. Fukagawa,[7] Lewis H. Ziska[8]*

Rice program at CIAT

We are a multidisciplinary team aligned to:

Ensure calorie intake for the world rural and urban communities, with a healthier, abundant and nutritious rice with sustainable and climate friendly practices. Contributing to a decent work and economic growth through the reinforcement of rice value chain in Latin America.

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How we do it ?

Breeding

We improve rice to deliver safe, healthy and highly productive germplasm to farmers eco-friendly production systems adapted to climate change.

Partnership

We create and deliver solutions through the collaboration and support of people and organizations more sustainable and competitive rice value chain.

Foresight

We develop methods and technologies that allow us to study market dynamics, consumer preferences and predict climate change variability rice crop adaptation to a changing world.

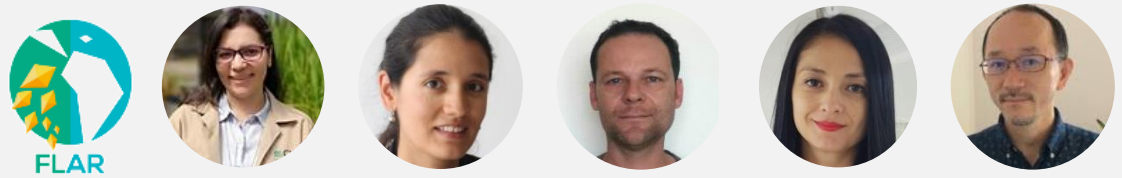
Innovative digital solutions

We develop innovative solutions for precision agriculture and high throughput phenotyping accurate selection in the breeding process.

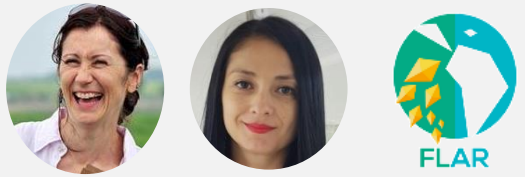
Objectives

Rice program specific objectives and Research groups

Develop technologies towards sustainable intensification of rice cultivation



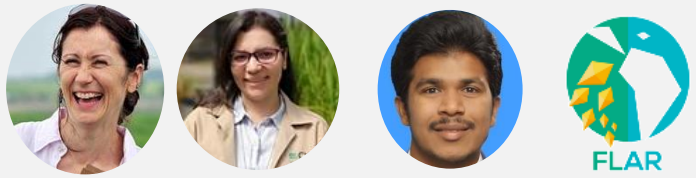
Develop nutritious and healthy rice



Contribute to achieve resilience to climate change

Increase rice stability by increasing disease resistance

Develop and implement methods to increase genetic gains



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How we work in our team…

Trait development pipeline

Product scoping → Phenotyping for donor discovery → Locus identification → Locus deployment → Product testing → Product introduction

Breeding Pipeline

Product design → Breeding strategy an optimization → Product development and testing #1 → Product testing #2 → Product multiplication → Product introduction

Climate action /data

Impact assessment

Biotic resistance

Abiotic tolerance

Phenomics

Molecular Markers

Grain Quality

Plant Breeding

Genetics / Gene editing

Agronomy

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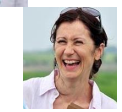
Rice program –team

Rice program leader — Maria Fernanda Alvarez

FLAR leader — Eduardo Graterol-FLAR

Plant Breeding

Cecile Grenier CIRAD-CIAT
Maria Fernanda Alvarez CIAT
Yamid Sanabria FLAR
Edgar Corredor FLAR



Impact assessment

Robert Andrade-CIAT /
Sergio Urioste

Grain Quality

Katherine Loaiza-FLAR

Biotic resistance

Gloria Mosquera (Pathology) (50%)-CIAT
Maribel Cruz (VHB)FLAR

Abiotic resistance

Maribel Cruz FLAR
Camila Rebolledo CIRAD-CIAT
Michael Selvaraj- CIAT

Phenomics

Camila Rebolledo CIRAD-CIAT
Michael Selvaraj CIAT

Molecular Markers

Constanza Quintero CIAT

Agronomy

Luciano Carmona FLAR
Manabu Ishitani CIAT
Satoshi Orgawa CIAT-JIRCAS

Genetics and gene editing

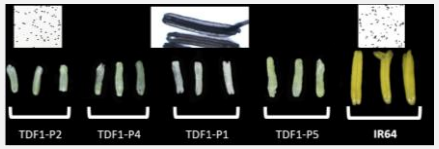
Mathias Lorieux IRD-CIAT
Sandra Valdes CIAT

Bioinformatics

Anestis Gkanogiannis CIAT

Advanced breeding
Gene editing and phenotyping tools

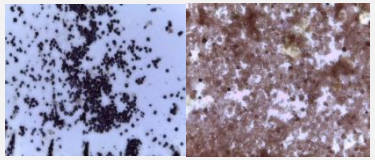
1. Male sterility



2. Grain Number

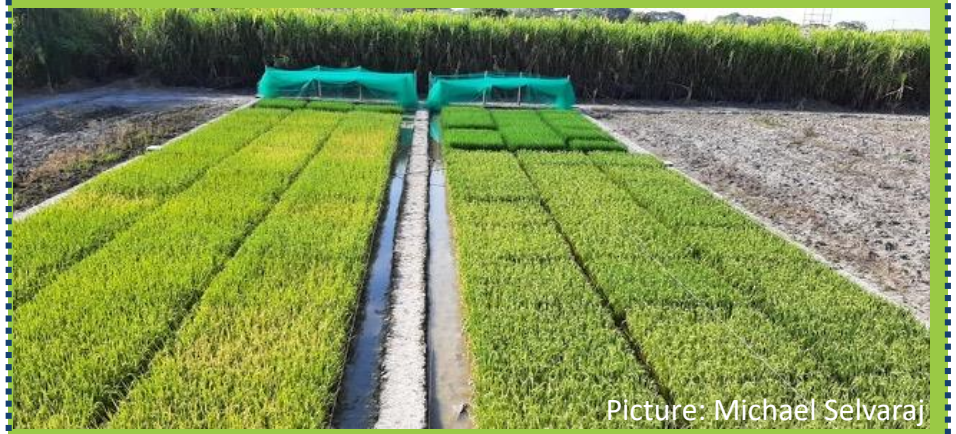
wt  Gn1a

3. Waxy

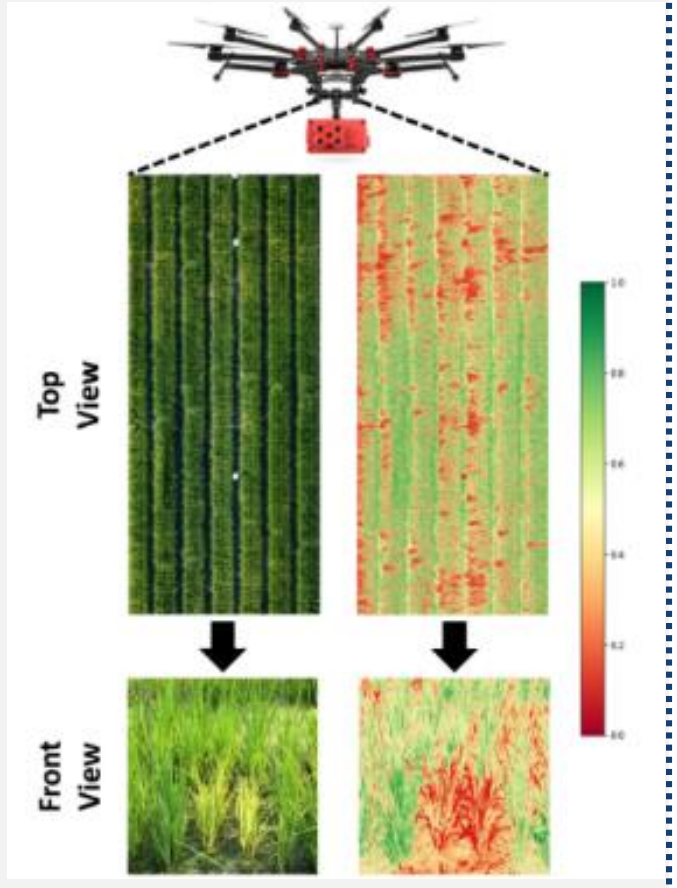
wt  waxy

4. HBRV Two Genes Validated

First Gene-Edited *Xoo*-Resistant Rice Deregulated in the World's South (outside China)



Indicas IR64 and Ciherang-Sub1
Second Confined Field Trial
(CIAT's Field in Palmira, Colombia)



Drone screening for diseases

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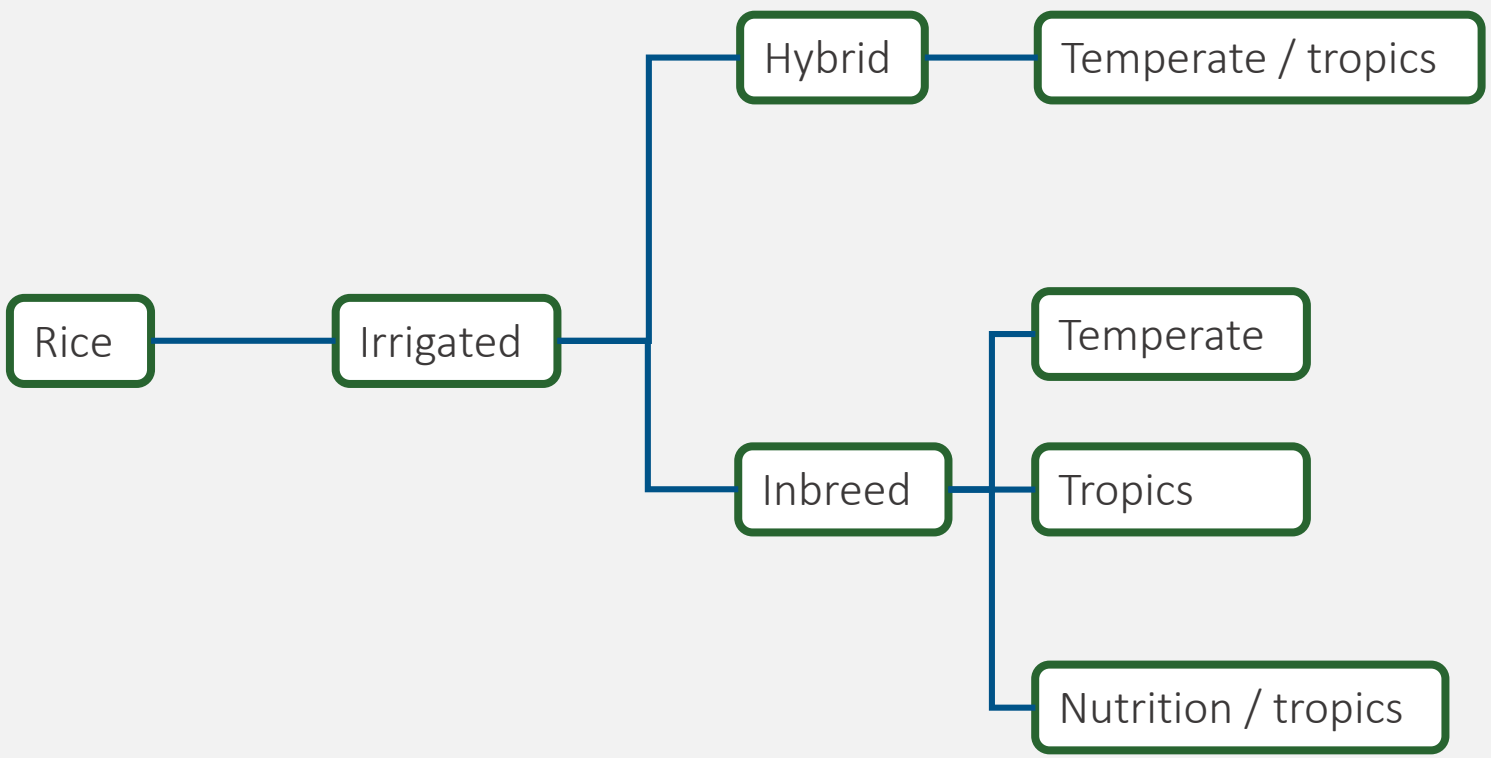
Breeding pipelines

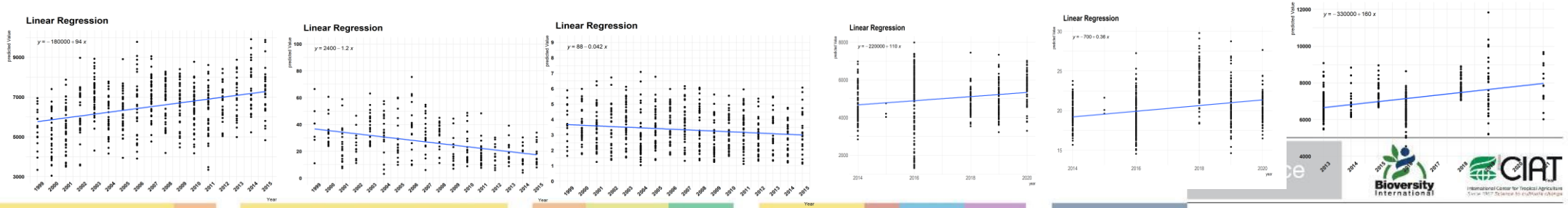


Breeders

Maria F. Alvarez, CIAT	HIAAL
Maria F. Alvarez, CIAT Edgar Corredor, FLAR Yamid Sanabria, FLAR	FLAR
Cécile Grenier, CIRAD-CIAT	HarvestPlus

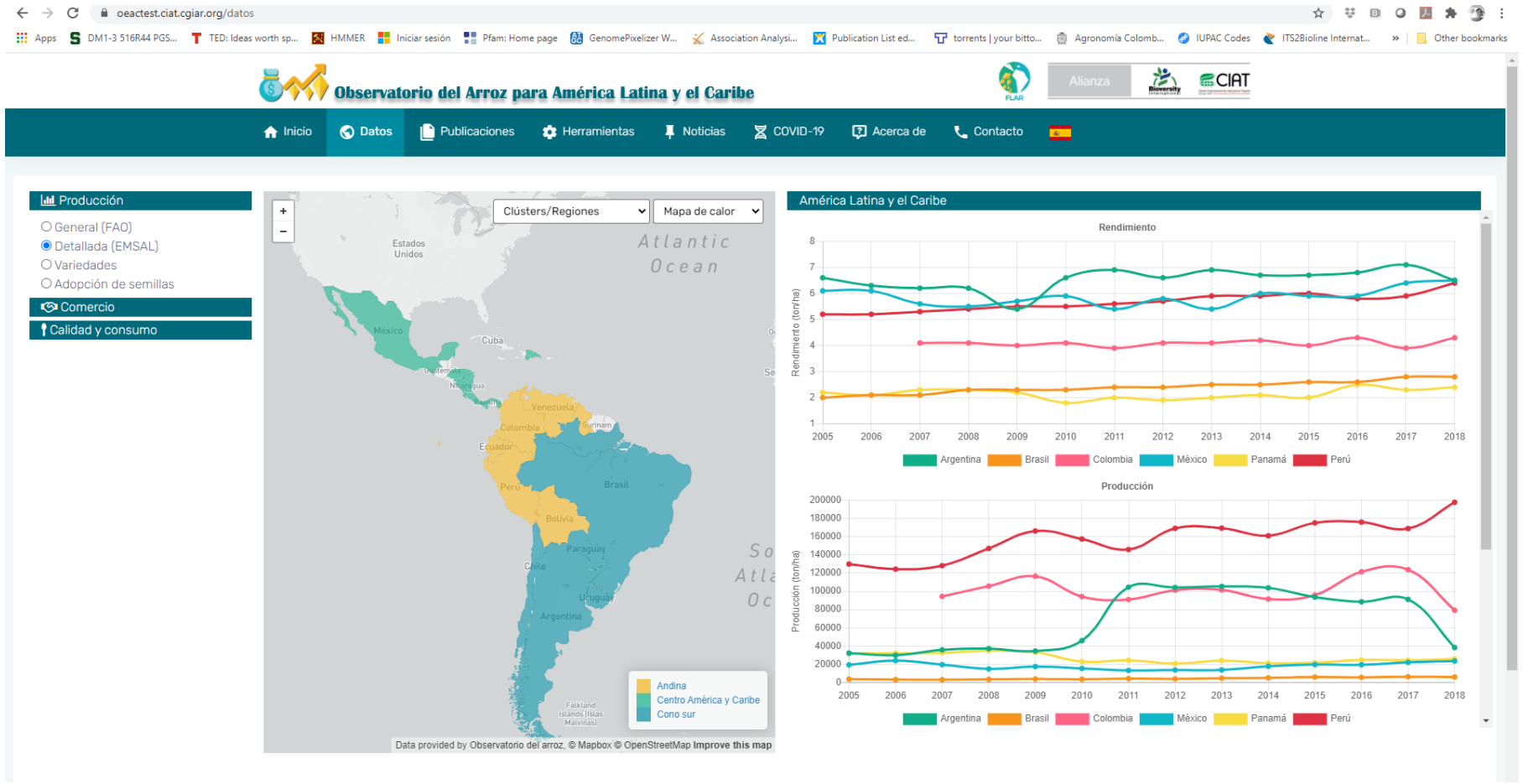
Genetic gain - Rice

	LAC-tropics long, slender			LAC-tropics Zn		LAC-tropics hybrids
Trait	**Yield (ton/ha)**	**VHB(%)**	**BLAST incidence scale**	**Yield (ton/ha)**	**Zn**	**Yield**
Gain per year	**1.62**	**-3.28**	**-1.15**	**2.3**	**1.8**	**2.4**
Num. of trials	1 (ERA)	1 (ERA)	1 (ERA)	21	18	7
Year	1998-2014	1998-2014	1998-2014	2011-2020	2011-2020	2012-2020
Num. of loc*	1	1	1	9	10	2
Common checks	NA	NA	NA	4	4	3
slope	0.009	-1.21	-0.04	0.109	0.358	0.165
intercept	-330	-420	-1200	-1773	-940	6.651



Rice Observatory for LAC

https://oeactest.ciat.cgiar.org/datos



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Delivery

Tropic/Temperate

FLAR: 25 years , 17 countries , 87 varieties

Tropic biofortified

HarvestPlus: 6 years, 6 countries, 2 varieties

Tropic/temperate

CIAT: 50 years , 17 countries , 230 varieties (CIAT- germplasm)
HIAAL: 9 years, 11 countries , 2 hybrids

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Thank you!