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AGRILINKS




Current and Emerging Threats to Crops: Building the Knowledge Base

Speakers: *Rob Bertram, USAID Bureau for Resilience and Food Security*

Angela Records, USAID Bureau for Resilience and Food Security

Dr. R. "Muni" Muniappan, Feed the Future Innovation Lab for Integrated Pest Management

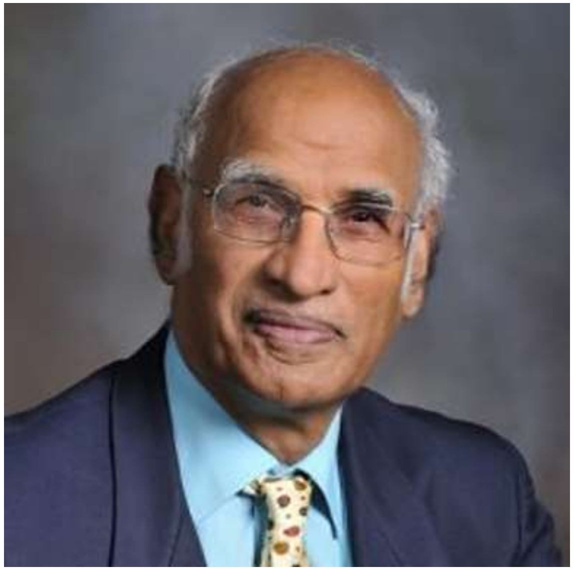
Dr. B. M. Prasanna, CIMMYT Maize Program & CRP MAIZE

Dr. Gael Pressoir, Quisqueya University Senior Scientist, Chibas Foundation

Moderator: *Tor Edwards, USAID Uganda Mission*

Date: October 21, 2020

Director, Feed the Future Innovation Lab for Integrated Pest Management, Virginia Tech University



Dr. R. Muni Muniappan is an entomologist who has specialized in biological control and integrated pest management research in the tropics for more than 35 years. His primary work experience has focused on the biological control of invasive weeds such as Chromolaena odorata, Lantana camara, Coccinia grandis, and Mimosa diplotricha. He also specializes in insect pests of tropical fruit and vegetable crops such as mealybugs, scale insects, whiteflies, caterpillars and weevils. As the Program Director for the Integrated Pest Management Innovation Lab, Dr. Muniappan works with USAID and project partner institutions in the United States and developing countries in Asia, Africa, Eastern Europe, the Caribbean and Latin America. In addition to his duties with the Center for International Research, Education, and Development (CIRED) at Virginia Tech University, he is currently serving as chairman of the global working group on Chromolaena for the International Organization for Biological Control. As a major leader in his field, Dr. Muniappan has published over 200 research and extension articles.

Biological Control of an Invasive Insect, Papaya Mealybug, and an Invasive Weed, Parthenium

Muni Muniappan
Director, IPM Innovation Lab
Virginia Tech

Invasive Alien Species (IAS)

- Papaya mealybug and parthenium are natives of Mexico.
- Both invaded Africa and Asia; in addition, parthenium reached Australia.
- Alien species become invasive in the introduced countries as they reach without their natural enemies that kept them under control in their native countries.
- IAS cause about $120 billion in damage and management costs annually in the U.S. (Pimmentel, D. 2011).
- Losses to agriculture:
    - Weeds - $27 billion
    - Insect pests - $14 billion
    - Pathogens - $22 billion

Biological control

Classical: involves introducing natural enemies from a pest's native range into a new area where native natural enemies do not provide control. Examples: Papaya mealybug control; Parthenium control in Australia; Cassava mealybug in Africa and Southeast Asia; Mango mealybug in Africa.

Papaya mealybug

Parthenium in a pasture

Papaya mealybug, *Paracoccus marginatus*

Order: **Hemiptera**
Suborder: **Sternorrhyncha**
Family: **Pseudococcidae**

- Native to Mexico
- First collected in 1955
- Started to spread to other countries in 1994
- It is polyphagous – host range 60 species of plants including several crops such as cotton, cassava, mulberry, eggplant etc.

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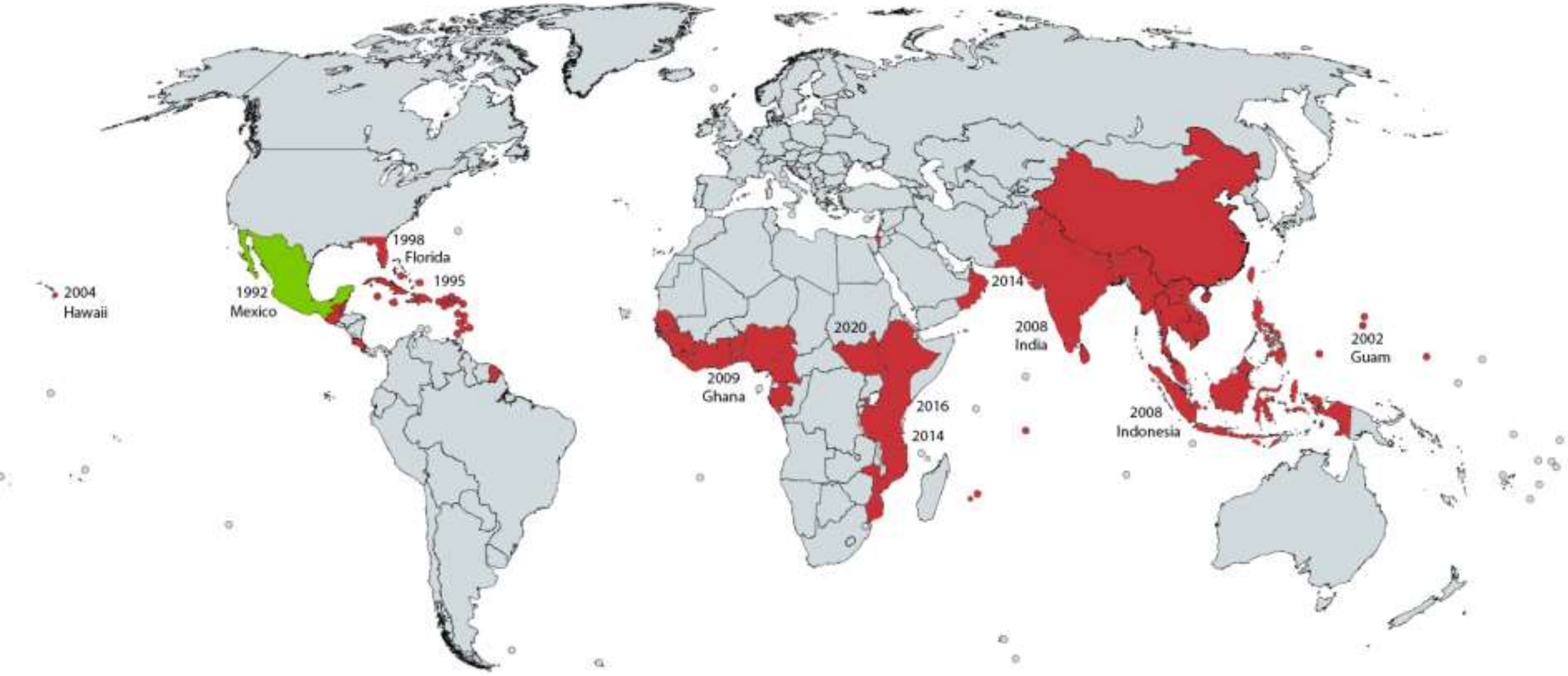
Spread of Papaya Mealybug



A. Shabbir

Parasitoids of Papaya Mealybug Collected in Mexico

- 1999 – USDA/ARS scientists collected three parasitoids on papaya mealybug in Mexico
- They were sent to Beneficial Insects Laboratory in Delaware to screen for hyperparasitoids and host specificity testing.
- Later they were cultured in a laboratory in Puerto Rico with the support of USDA/APHIS.
- This laboratory supplied to countries wherein papaya mealybug invaded upon request from their NPPOs.

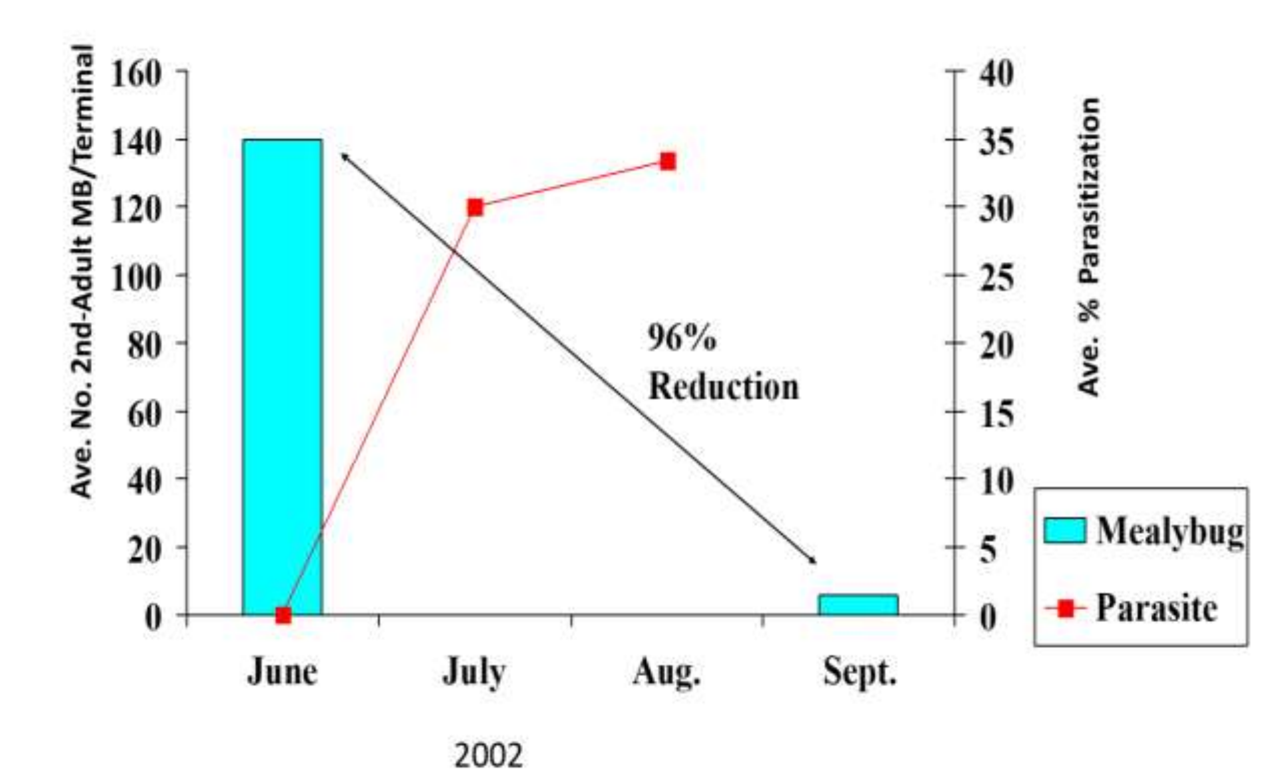
Anagyrus loecki

Acerophagus papayae

Pseudleptomatix mexicana

Papaya Mealybug Control in Guam

- Papaya mealybug was recorded in Guam in early 2002.
- Parasitoids were imported from Puerto Rico and released in June 2002.
- By Sept. 2002, papaya mealybug population declined in the study sites.



D. Meyerdirk

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Papaya Mealybug in India

- Papaya mealybug found in India - Aug. 2008
- Parasitoids introduced - Aug. 2010
- Papaya mealybug controlled - Feb. 2011

Collaborators:

- USAID Mission in India
- USDA – APHIS
- Indian Council of Agricultural Research
- Directorate Plant Protection, Quarantine and Storage
- National Bureau of Agricultural Insect Resources
- Tamil Nadu Agricultural University
- IPM Innovation Lab

Biological Control of Papaya Mealybug

Parasitoid used for control

Benefit to India from releasing the parasitoid: $500 million to $1.34 billion

This parasitoid moved with the papaya mealybug into Asian countries fortuitously and controlled the pest.

Papaya Mealybug Control in Africa

- Papaya mealybug invaded Ghana in 2009.
- FAO initiated a biological control project in 2010.
- *Acerophagus papayae* was imported from Puerto Rico, cultured, and released in the fields in July 2011.
- Papaya mealybug kept moving north and eastwards from Ghana.
- IITA-Benin imported a stock culture of *A. papayae* from Ghana in 2013.
- In April 2013, it was released in the fields.
- *Acerophagus papayae* has fortuitously established in many African and Asian countries with the papaya mealybug and has controlled it.

Parthenium hysterophorus (Asteraceae)

Known in Ethiopia as “Faramasissa,” meaning “sign your land away”.

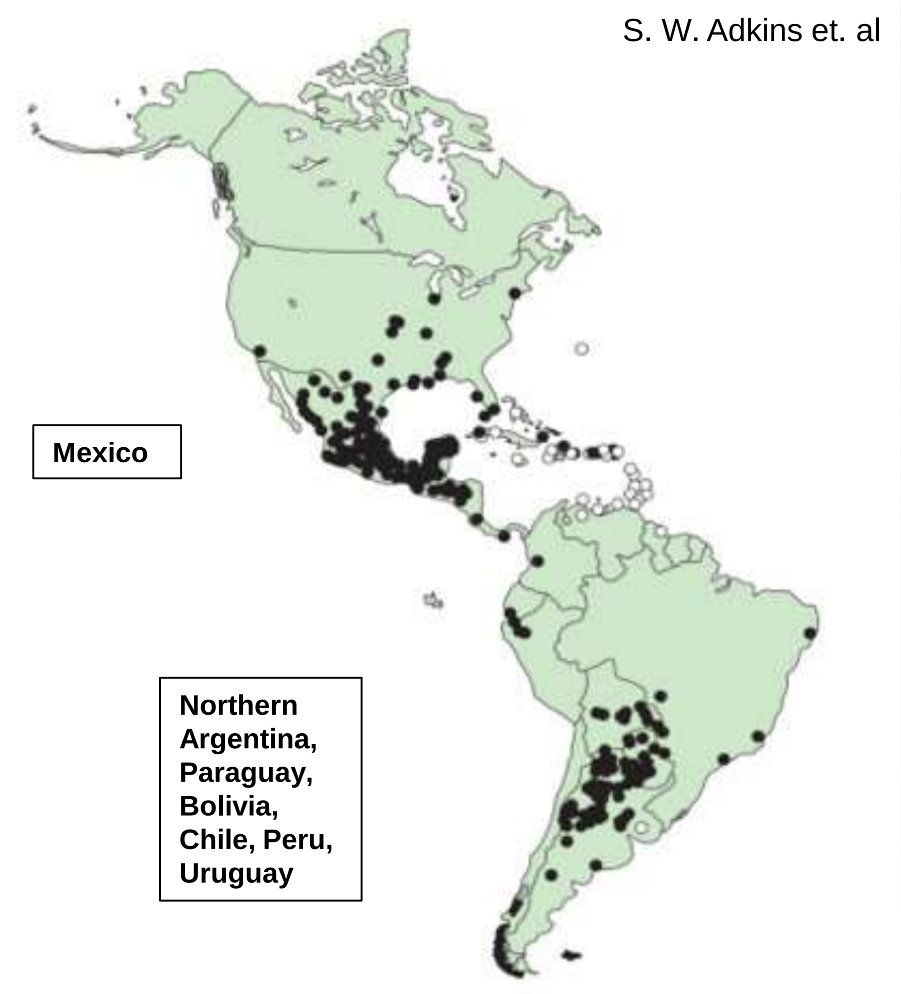
Parthenium is native to Mexico.

It has spread to East and Southern Africa, Australia, and Middle East, South and Southern Asia.

It is an aggressive invader:

- A single plant can produce 25,000 seeds.
- It can complete its life cycle in 6-8 weeks.
- It is allelopathic and releases toxic chemicals.

Centers of Origin of Parthenium



- There are two centers – one in Mexico and the other in South America
- Population from Mexico center spread to Africa, Asia, and Australia

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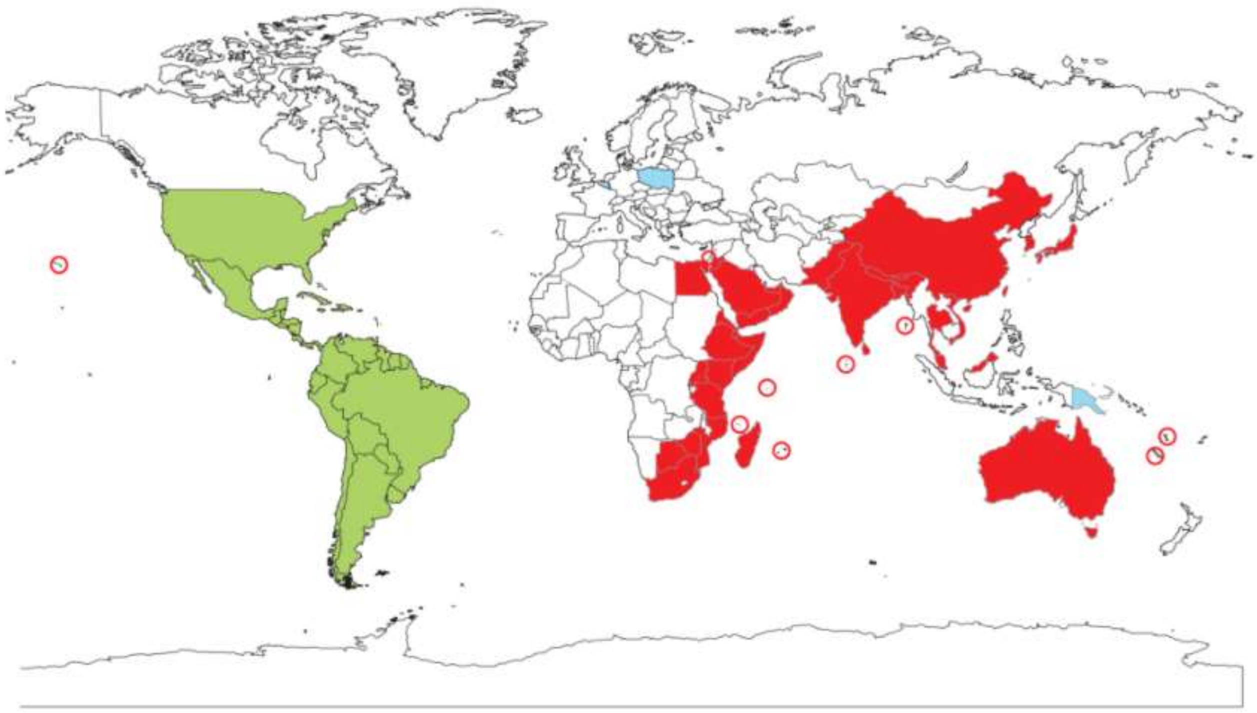
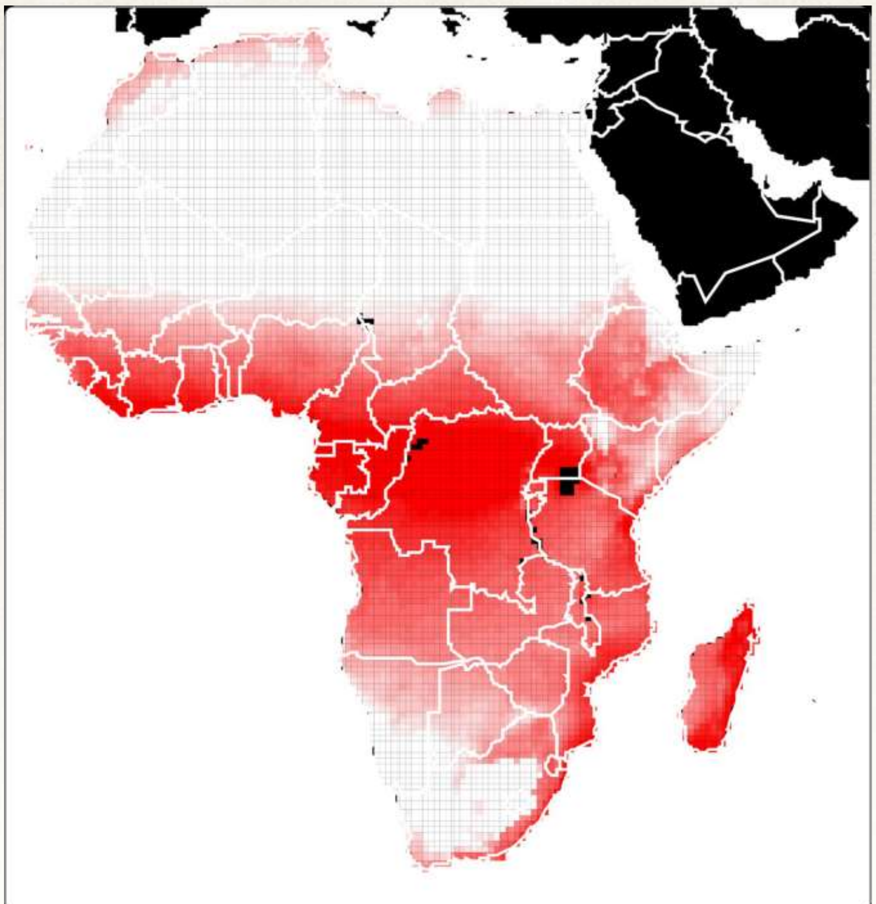
Parthenium hysterophorus



It has now established in 48 countries

A. Shabbir et. al

CLIMEX-generated map of the relative climatic suitability of Africa for *Parthenium hysterophorus*



- Established in 14 African countries in East and Southern Africa.
- The darker the red shading, the more suitable the area is for parthenium.
- Need to suppress it in East and Southern Africa and prevent its spread to Central and West Africa.

McConnachie et al. 2010

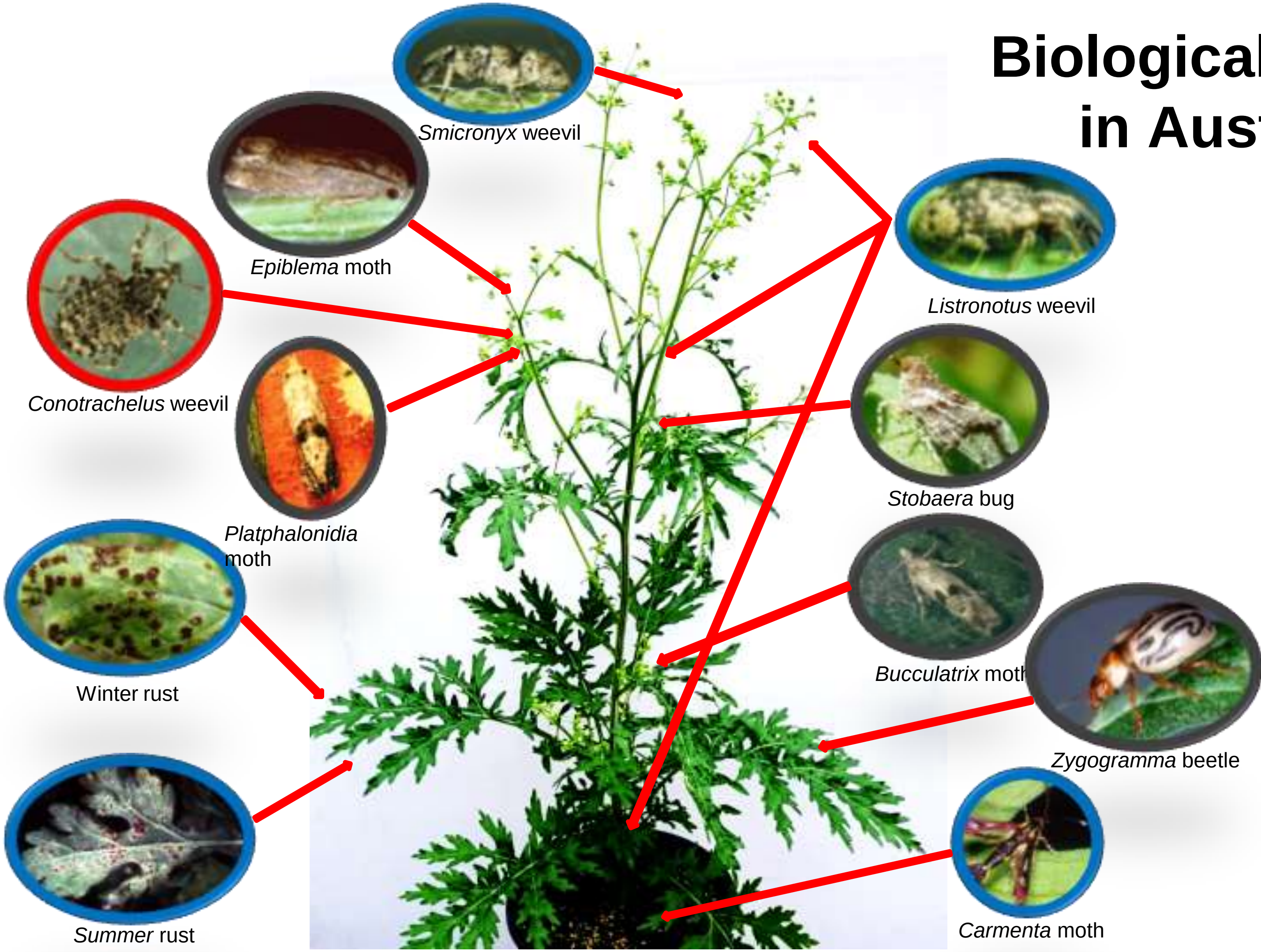
Parthenium Impact

Dermatitis Caused by Parthenium

- It also causes rhinitis and asthma in humans

A. Shabbir and others

Biological control in Australia



Dhileepan

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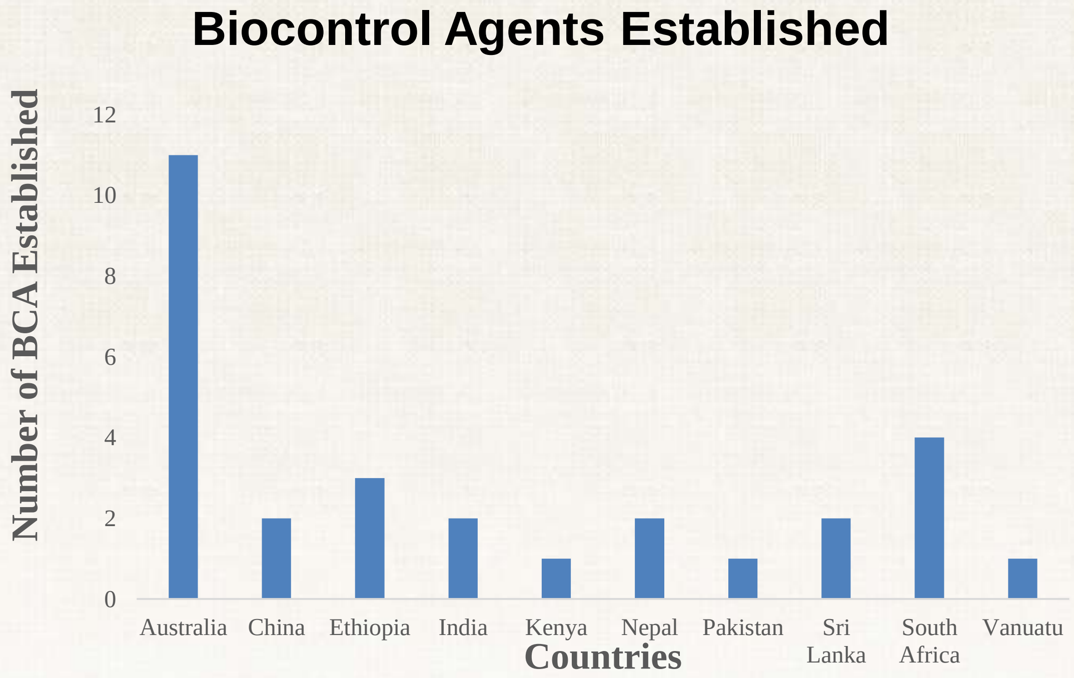
Role of IPM Innovation Lab in Biocontrol of Parthenium

- IPM IL initiated biocontrol of Parthenium in Ethiopia in 2005.
- Virginia State University (MSI) is the main partner.
- IPM IL established a quarantine facility for host specificity testing.
- IPM IL provided training to Ethiopian scientists and technicians in South Africa.
- Field released and established two natural enemies with the approval of Government of Ethiopia and USAID.
- Ethiopia is the third country in implementing biocontrol of Parthenium after Australia and South Africa.



Zygogramma bicolorata, a leaf-feeding beetle

- One of the biocontrol agents that established in Ethiopia

Mersie

Listronotus setosipennis, stem-boring weevil

- Another biocontrol agent that established in Ethiopia





Mersie

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Zygogramma Release by Railroad Track at Wollenchiti, Ethiopia

Released 1,000 Zygogramma on July 16, 2016

Vegetation on September 7, 2016

Vegetation on September 9, 2018

Mersie

Listronotus setosipennis at Mojo, Central Ethiopia

Before release in 2017

A year after release in 2018

Mersie

Economic Benefits

	Buffel Grass	Blue Grass
Increase in feed (kg/ha)	22.44	32.54
Increase in cattle (hd/ha)	0.0021	0.0020
Economic benefits ($/ha)	$0.82	$0.78

Cost benefit = $ 2.09
(based on 2000 value)

Biocontrol

Dhileepan

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Thanks

Dr. John Bowman, AOR, for his support of the project, and
Dr. Wondi Mersie, for implementing the project for the past 15 years

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Management Entity


Zara Shortt


Dr. Anamika Sharma


Sara Hendery


Courtney Viers


Daniel Sumner

Collaborators

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VIRGINIA STATE

VIRGINIA TECH

NBAIR

NARO

USDA

WOLLO UNIVERSITY

Queensland Government

EIAR

ICAR

HARAMAYA UNIVERSITY

ARC • LNR

CABI

KALRO

Dr. B. M. Prasanna, Director, CIMMYT Maize Program & CRP MAIZE

B.M. Prasanna is the Director of CIMMYT's Global Maize Program and the CGIAR Research Program MAIZE. Based in Nairobi, Kenya, Prasanna leads the multi-disciplinary CIMMYT team, with focus on maize improvement in sub-Saharan Africa, Latin America and Asia. He provides technical oversight to several multi-institutional projects on development and deployment of elite, stress resilient and nutritionally enriched maize varieties in the tropics, besides application of novel tools and technologies for enhancing genetic gains and breeding efficiency. Prasanna has been leading CIMMYT's efforts, together with international and national partners, in tackling the challenges of maize lethal necrosis disease in Africa, and Fall Armyworm in both Africa and Asia.

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MLN Management in Africa:
Intensive Multi-disciplinary R4D and Multi-Institutional Efforts

B.M. Prasanna

Director, Global Maize Program, CIMMYT
& CGIAR Research Program MAIZE
Email: b.m.prasanna@cgiar.org

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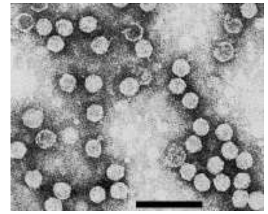
CIMMYT International Maize and Wheat Improvement Center
MAIZE

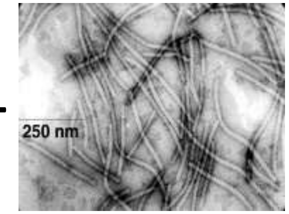
Maize Lethal Necrosis (MLN) in Eastern Africa

MCMV



+

Potyvirus (SCMV)



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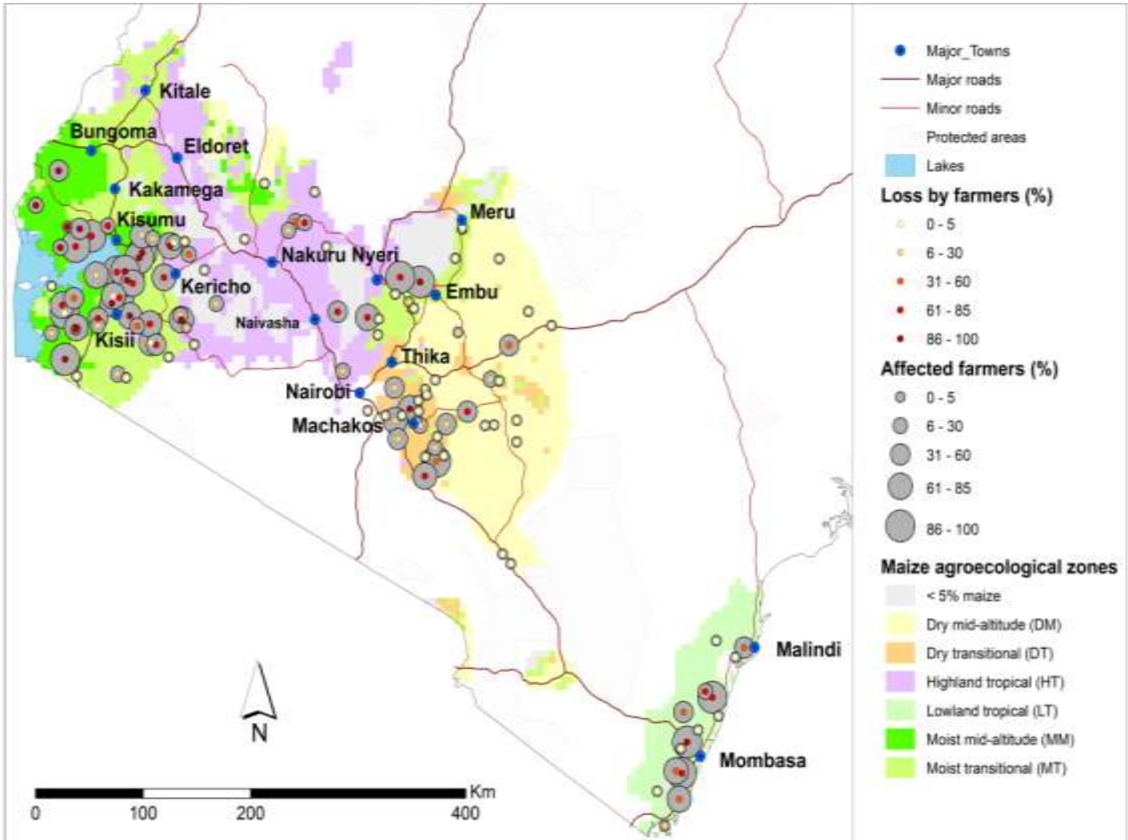
MLN

- MLN first appeared in Kenya in 2011 and was then reported in several countries in Uganda (2012), Tanzania (2012), Rwanda (2013), D.R. Congo (2013) and Ethiopia (2014).
- Losses to maize production in farmers' fields due to MLN in the impacted countries ranged from 25% to 100%.

Economic Impact of MLN

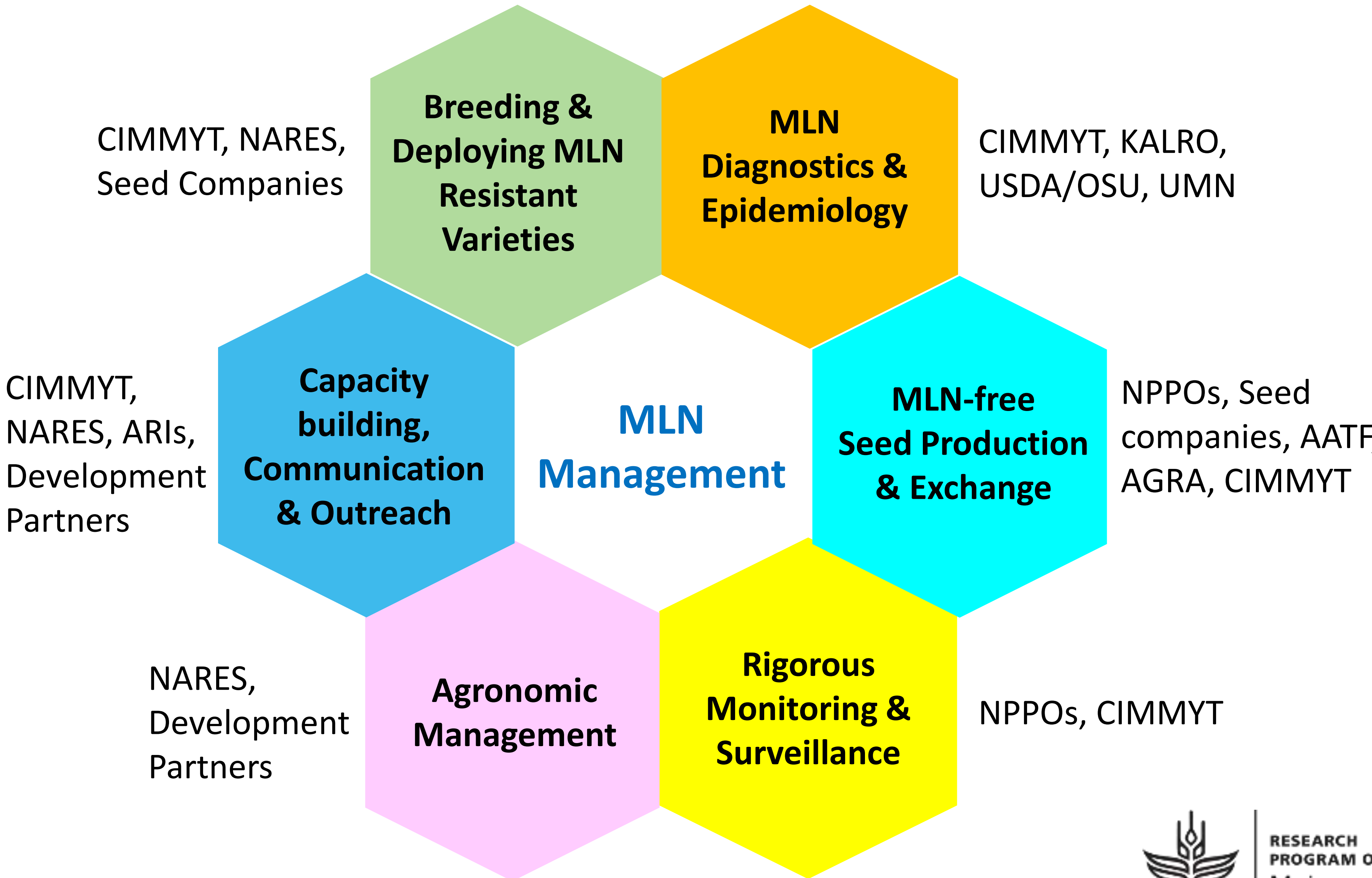


In Kenya, the aggregate national loss of maize production due to MLN in 2013 was about **0.5 million tons** at a value of **US$ 180 million** (De Groote et al., 2016).

CIMMYT

Tackling a Complex Challenge

Success through Integration of Various Components



CGIAR RESEARCH PROGRAM ON Maize

MLN Screening Facility at KALRO-Naivasha, Kenya

- **MLN Phenotyping Service** provided by CIMMYT since 2014.
- **~200,000 germplasm entries** screened against MLN under artificial inoculation at the Naivasha facility.
- Of these, **61% from CIMMYT, 17% from NARS, and 22% from the private sector**.

From less than 5 inbred lines with tolerance/resistance to MLN in 2013, today we have **more than 50 elite and diverse CIMMYT lines with MLN resistance.**

CGIAR RESEARCH PROGRAM ON Maize

Deployment of MLN-tolerant/Resistant Hybrids

19 CIMMYT-derived, MLN-tolerant/resistant hybrids released so far in Eastern Africa

CGIAR RESEARCH PROGRAM ON Maize

Genetic Architecture of MLN Resistance in Maize

Theor Appl Genet (2015) 128:1957–1968
DOI 10.1007/s00122-015-2559-0

Genome-wide association and genomic prediction of resistance to maize lethal necrosis disease in tropical maize germplasm

Manje Gowda[1] · Biswanath Das[1] · Dan Makumbi[1] · Raman Babu[2] · Kassa Semagn[1] · George Mahuku[1] · Michael S. Olsen[1] · Jumbo M. Bright[1] · Yoseph Beyene[1] · Boddupalli M. Prasanna[1]

Mol Breeding (2018) 38: 66
https://doi.org/10.1007/s11032-018-0829-7

Discovery and validation of genomic regions associated with resistance to maize lethal necrosis in four biparental populations

Manje Gowda · Yoseph Beyene · Dan Makumbi · Kassa Semagn · Michael S. Olsen · Jumbo M. Bright · Biswanath Das · Stephen Mugo · L. M. Suresh · Boddupalli M. Prasanna

genes

Article

Genome-Wide Analyses and Prediction of Resistance to MLN in Large Tropical Maize Germplasm

Christine Nyaga [1,2], Manje Gowda [2,*], Yoseph Beyene [2], Wilson T. Muriithi [1], Dan Makumbi [2], Michael S. Olsen [2], L. M. Suresh [2], Jumbo M. Bright [2], Biswanath Das [2] and Boddupalli M. Prasanna [2]

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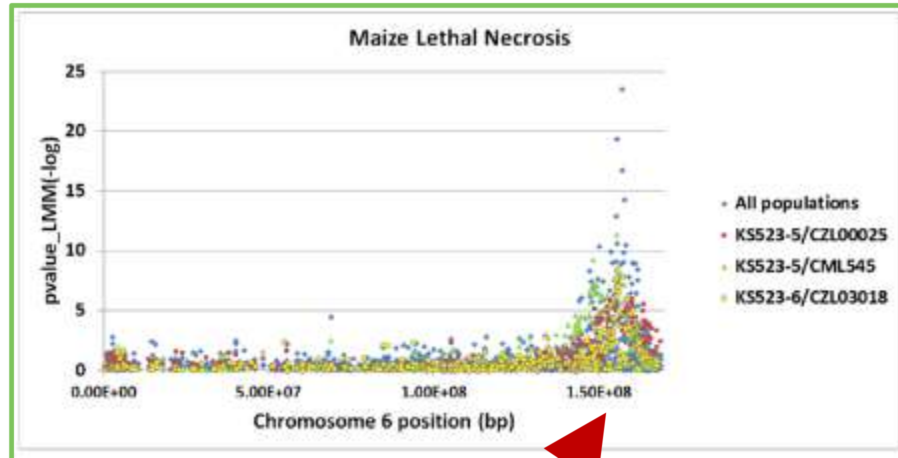
qMLN_06.157 for MLN Resistance



A major QTL on chr. 6 in KS23 that works across diverse recipient genetic backgrounds

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Maize

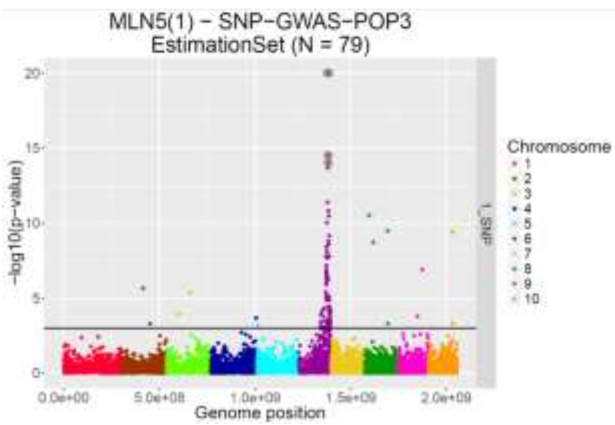
Introgressing MLN Resistance through Molecular Breeding

Fast-tracked conversion of **52** elite DT but MLN-susceptible CIMMYT lines into MLN-resistant versions

CGIAR RESEARCH PROGRAM ON Maize

Genome Editing for MLN Resistance

Work in Progress

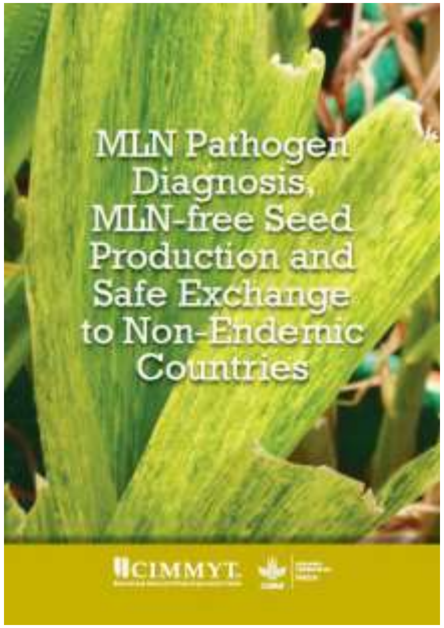


Fine-mapping of chr.6 QTL in several mapping populations during 2018-2020

- **Fine-mapping, cloning and editing** the causal genomic region(s) for MLN resistance.
- **Establishing a pipeline to edit for MLN resistance** in MLN-susceptible lines that are parents of CIMMYT-derived commercial maize hybrids in Africa.
- **Strengthening the capacity for genome editing**

BILL & MELINDA GATES foundation | CIMMYT International Maize and Wheat Improvement Center | CORTEVA agriscience | KALRO | USDA United States Department of Agriculture Agricultural Research Service

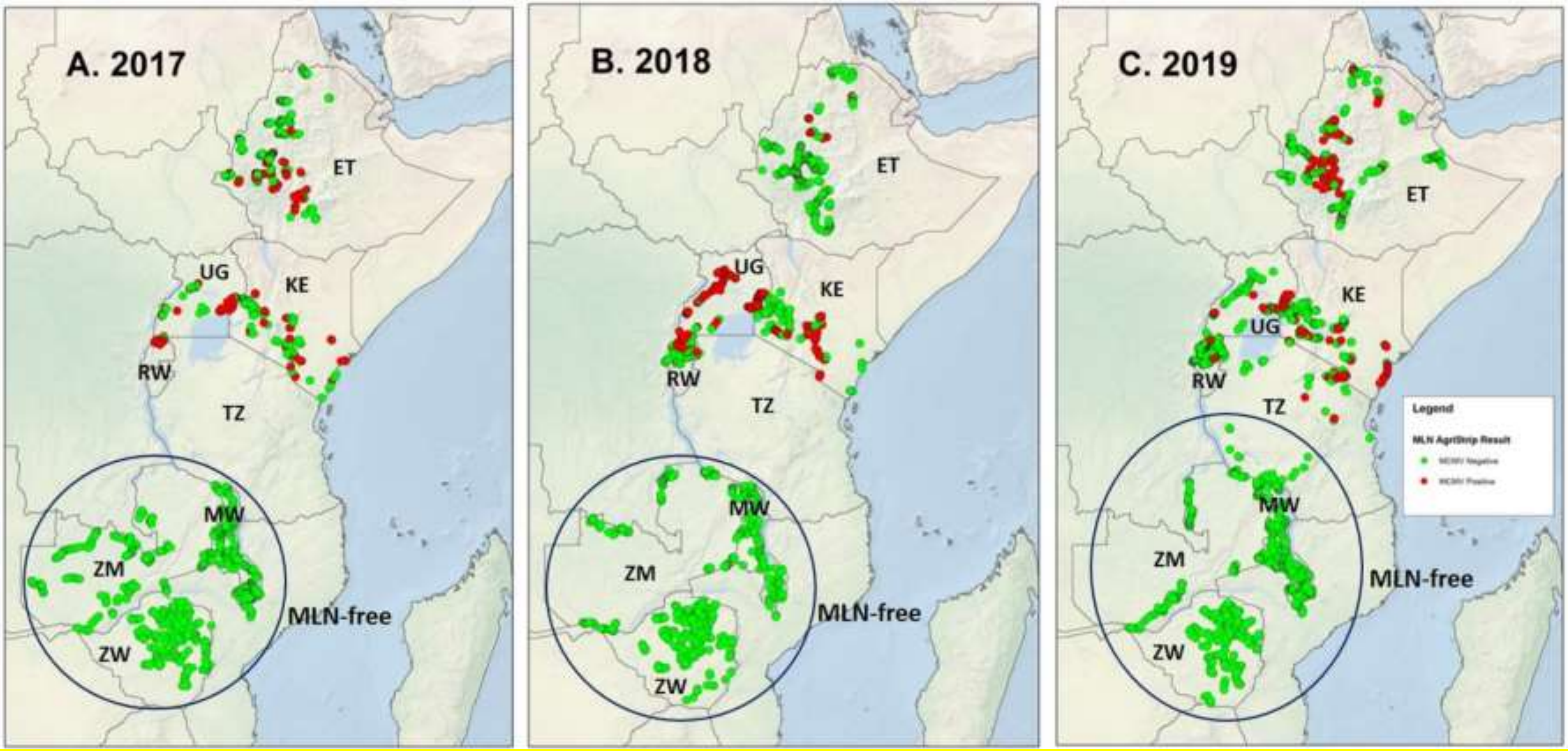
Strengthening Local Capacity for MLN Diagnostics, Surveillance and Management in Sub-Saharan Africa



Country	NPPO Personnel				Seed Company Peronnel				NARES Staff				Seed Growers			
	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019
Kenya	12	28	35	25	22	68	25	6	12	25	12	8	68	260	230	121
Uganda	8	15	22	8	12	35	25	11	5	12	5	8	45	150	158	89
Tanzania	8	18	28	21	15	32	68	6	4	8	6	13	33	60	320	78
Ethiopia	8	12	18	47	18	61	18	12	5	18	12	16	28	93	335	125
Rwanda	2	14	55	67	12	21	13	8	7	13	28	21	23	125	138	225
Malawi	12	8	2	13	3	16	4	2	5	4	4	12	14	21	35	-
Zambia	18	18	3	12	4	25	5	3	4	6	12	4	18	28	45	-
Zimbabwe	13	12	8	4	4	32	6	2	4	8	8	3	22	32	32	-
TOTAL	**81**	**125**	**171**	**197**	**90**	**290**	**164**	**50**	**46**	**94**	**87**	**85**	**251**	**769**	**1,293**	**638**
	574				444				227				2,258			

MLN is kept under control, but not eradicated…

Need to keep continuous vigil!



MLN/MCMV surveillance and monitoring (using MCMV immunostrips) in farmers' fields and maize seed production fields in five MLN-impacted countries in eastern Africa (ET, KE, RW, TZ, UG), and three countries in southern Africa (MW, ZM, ZW).

USAID-funded MLN Diagnostics and Management Project

MLN Information Portal

https://mln.cimmyt.org

HOME | MLN OVERVIEW | MLN RESEARCH | SURVEILLANCE | MLN SCREENING | NEWS AND MEDIA | COMMUNITY OF PRACTICE | RESOURCES

search...

MLN in the news

- Deadly virus threatening maize
- Maize Lethal Necrosis: Possible threat to local maize production
- New facility to help Zimbabwe deliver healthy seeds
- Zimbabwe: Government unveils crop disease quarantine

CGIAR | RESEARCH PROGRAM ON Maize

Review

Virus Research (2020) 282: 197943

Maize lethal necrosis (MLN): Efforts toward containing the spread and impact of a devastating transboundary disease in sub-Saharan Africa

Prasanna Boddupalli[a,*], L.M. Suresh[a], Francis Mwatuni[a], Yoseph Beyene[a], Dan Makumbi[a], Manje Gowda[a], Mike Olsen[a], David Hodson[b], Mosisa Worku[a], Monica Mezzalama[b,1], Terence Molnar[b], Kanwarpal S. Dhugga[b], Anne Wangai[c], Lilian Gichuru[d], Samuel Angwenyi[e], Yoseph Alemayehu[f], Jens Grønbech-Hansen[g], Poul Lassen[g]

[a] *International Maize and Wheat Improvement Center (CIMMYT), ICRAF Campus, UN Avenue, Gigiri, Nairobi, Kenya*
[b] *CIMMYT, Km 45 México-Veracruz, El Batán, 56237, Texcoco, Mexico CDMX, Mexico*
[c] *Kenya Agricultural and Livestock Research Organization (KALRO), NARL, Waiyaki Way, Nairobi, Kenya*
[d] *Alliance for Green Revolution in Africa (AGRA), West End Towers, 4th Floor Kanjata Road, off Muthangari Drive, Off Waiyaki Way, P.O. Box 66773, Westlands, 00800, Nairobi, Kenya*
[e] *African Agricultural Technology Foundation (AATF), ILRI Campus, Naivasha Road, Nairobi, Kenya*
[f] *CIMMYT, ILRI campus, P.O. Box 5689, Addis Ababa, Ethiopia*
[g] *Dept. of Agroecology, Aarhus University, Blichers Allé 20, Postboks 50, DK-8830, Tjele, Denmark*

- Intensive breeding multi-disciplinary and multi-institutional efforts → major success in containing the spread and impact of MLN so far in SSA
- Systems/platforms should be sustained, and expanded, in light of increasing occurrence of devastating transboundary pathogens/pests, especially in the tropics.

Thanks!

- USAID, Bill & Melinda Gates Foundation, Syngenta Foundation for Sustainable Agriculture and MAIZE W1&2 Donors for supporting the work on MLN R4D
- KALRO, NPPOs and Private sector partners in Africa
- USDA/Ohio State University, Univ. of Minnesota, AATF, AGRA, Aaarhus University & IITA
- CIMMYT colleagues for their dedicated work

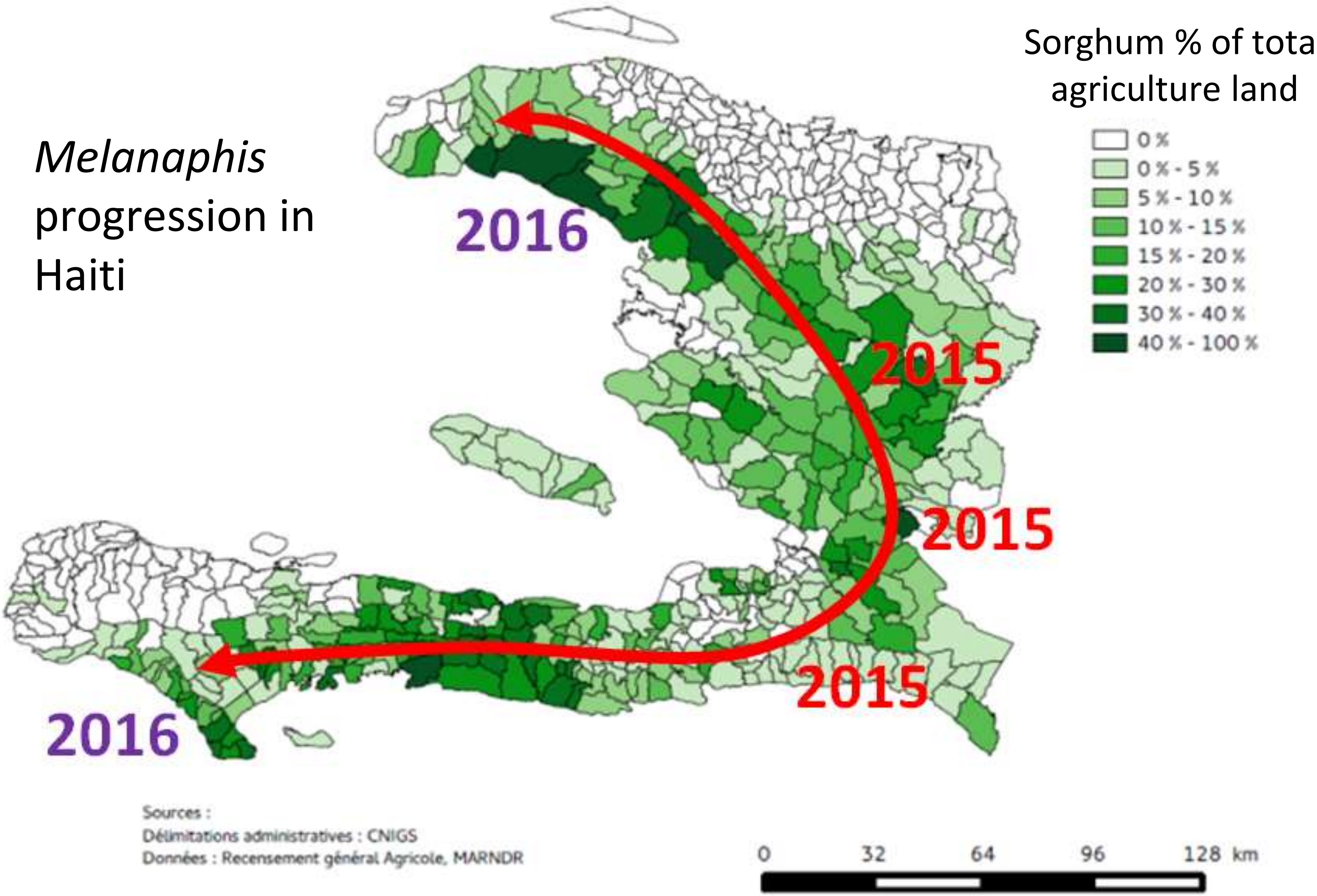
Dr. Gael Pressoir, Dean for the Faculty of Agricultural and Environmental Sciences, Quisqueya University Senior Scientist, Chibas Foundation

Dr. Pressoir currently serves as the Dean for the Faculty of Agricultural and Environmental Sciences (FSAE) at Quisqueya University and senior scientist of the Chibas Foundation (Haitian Center for Innovation in Biotechnology and Sustainable Agriculture) in Port-au-Prince, Haiti. He is a Haitian national trained as a sorghum breeder and applied plant geneticist with the French Research Institute for Development (IRD), CIMMYT, and Cornell University. Dr. Pressoir founded Chibas in 2010 with sorghum and edible Jatropha breeding programs. He has steadily expanded Haiti's crop improvement research portfolio into the current FSAE/Chibas team of more than 40 staff members led by seven new research faculty members at Quisqueya.

Saving sorghum from disappearance in Haiti

Gael Pressoir

Melanaphis progression in Haiti

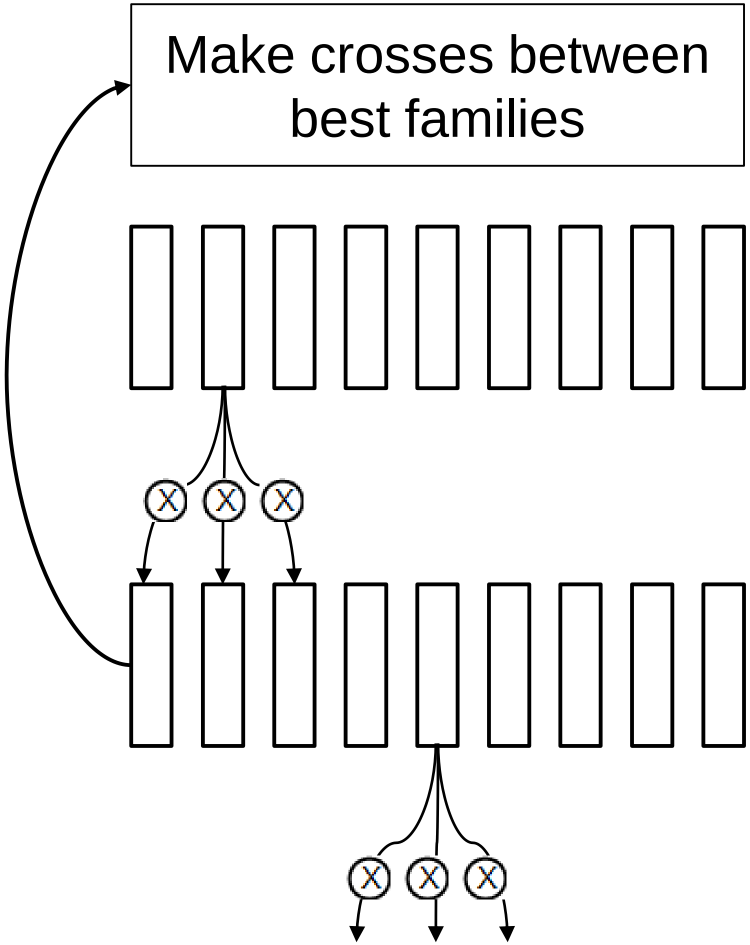





Success Stories

Recurrent selection for autogamous crops – Sorghum
S1 Phenotypic recurrent Selection (PRS)

Rapid cycling
Multiple parents



Full or half-sibs families

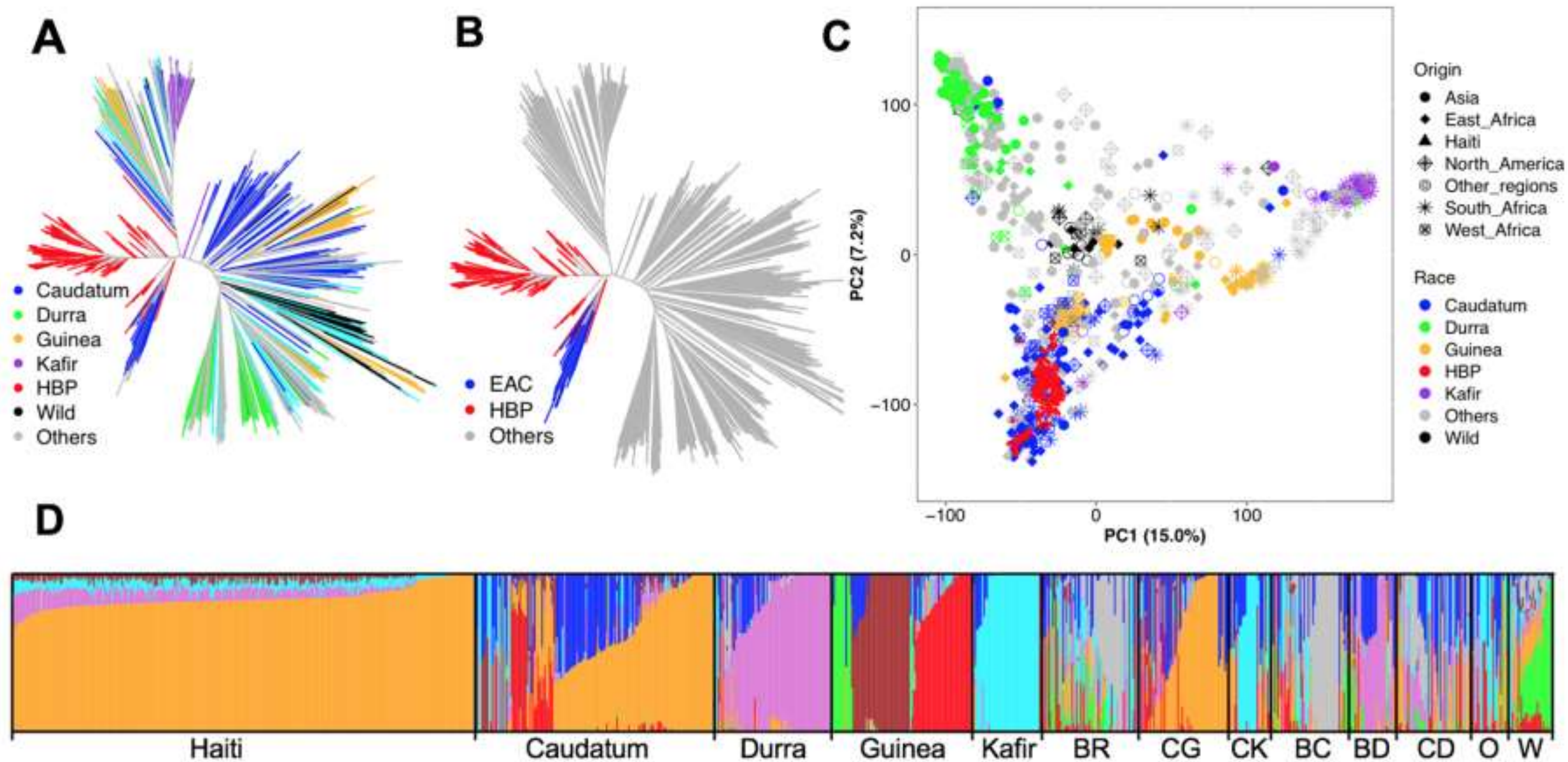
Select individuals within families - self

S1 progenies for evaluation of GCA (inbreeding)

Multi-location trials

Line development
Selfed progenies: S2, S3, S4, toward variety release

Genetic diversity is high in spite of population going through a severe selection pressure for SCA resistance



Collaborative Research on Sorghum and Millet

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USAID
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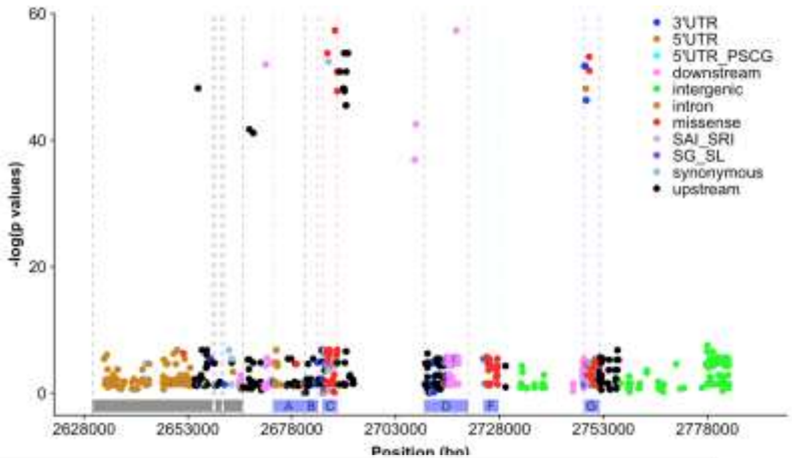
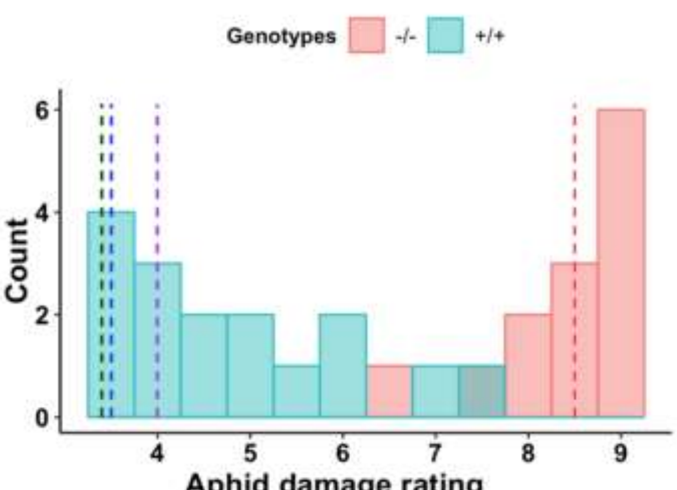
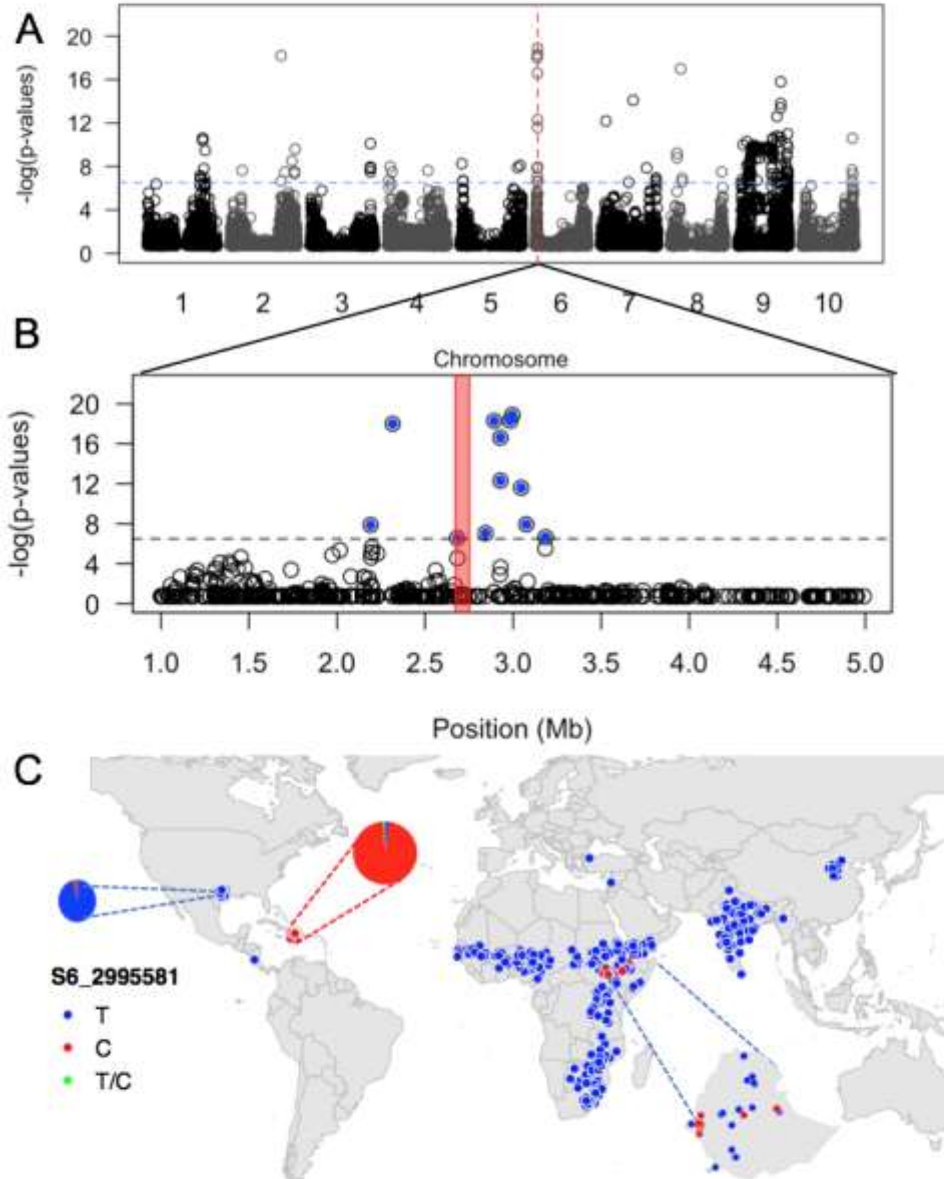
The Chibas population went through a selective sweep at specific locations including the *RMES1* locus on Chr 6

Kebede Muleta *et al* (manuscript in preparation with Geoff Morris' lab)







Collaborative Research on Sorghum and Millet

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Sorghum (*pitimi*) is back!
In our fields and in our plates

Farmers field of *Papèpichon*
(South of Haiti)

Threshing Papepichon
(North West)

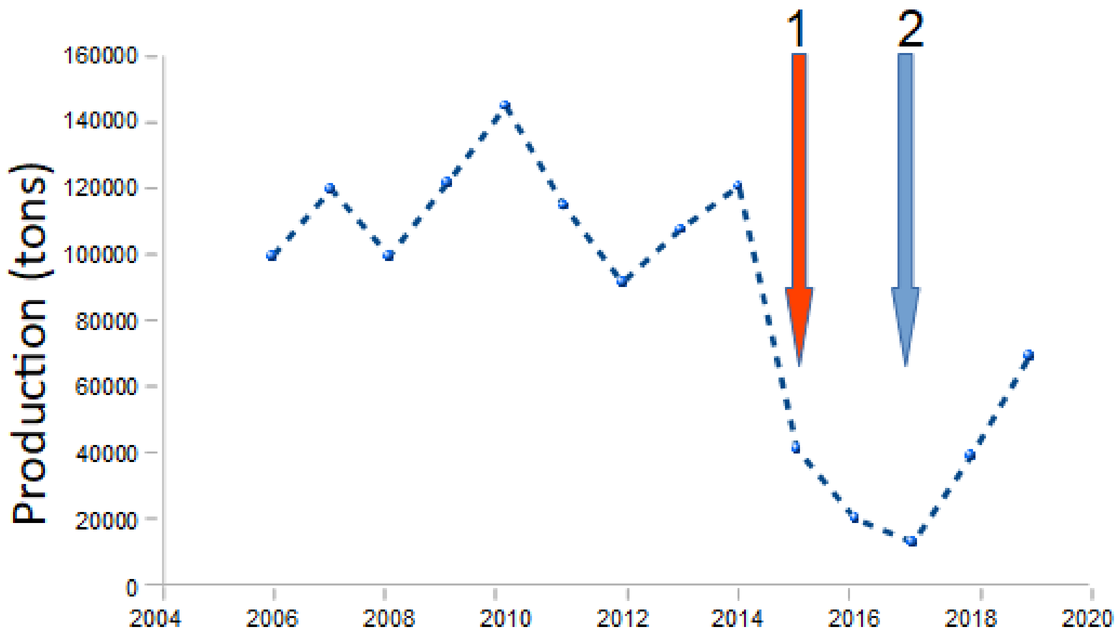
UNIVERSITÉ LAVAL
AKOSAA
Canada

Rescuing sorghum from disappearance in Haiti

The sugarcane aphid (SCA) infestation drove production from over 100,000 tons a year in 2014 to 14,000 tons in the three years that followed the infestation. At the lowest point, Chibas introduced *Papèpichon*, our first aphid resistant variety. From the introduction of *Papèpichon* at the end of 2017, production has been steadily recovering and has multiplied five-fold from 2017's nadir (absolute lowest point) in national sorghum production.

1. 2015 start of infestation by aphid, production plummets from >100,000 MT in 2014 to 40,000 MT in 2015, 20,000 MT in 2016, and only 14,000 MT in 2017

1. 2017 Introduction of the Chibas variety, the aphid resistant: Papèpichon. Production levels recovered significantly in two years, reaching 70,000 MT in 2019, but still falling short of pre-SCA levels.



>90% of the sorghum acreage is now grown with a Chibas variety

See USDA grain and feed annual 2020 report for Haiti
https://www.fas.usda.gov/data/haiti-grain-and-feed-annual-1

Distribution and release of *Papèpichon* in presence of his Excellency Jovenel Moise, President of the Republic of Haiti and her Excellency Paula Caldwell St Onge, Canada's Ambassador to the Republic of Haiti

12 Le Nouvelliste Vendredi 5 mai 2017

Economie

Distribution de semences de sorgho aux agriculteurs de la plaine du Cul-de-Sac

Plus d'une centaine d'agriculteurs de la plaine du Cul-de-Sac ont reçu des semences de la nouvelle variété de sorgho dénommée « Pa-Pe-Pichon». Cette distribution a eu lieu au Centre rural de développement durable de Bas-Boen, en présence du président de la République Jovenel Moïse, du ministre de l'Agriculture Carmel André Béliard, du sénateur de l'Ouest, Jean Renel Sénatus, de l'ambassadeur du Canada en Haïti, Paula Caldwell Saint Onge et de plusieurs autres hauts dignitaires nationaux et internationaux.

SCA Resistant varieties - different ideotypes

- **Sweet sorghum**
- **Mechanization ready**
- **Photoperiodic**

Selection of a photoperiodic SCA resistant sorghum

It takes a team too succeed

The Chibas team in Haiti

Gael Pressoir
Elise Leclerc
Marie Darline Dorval
Jean Rigaud Charles
Jemay Salomon
Anaise Laraque
Diana Joseph
Renaud Durosier
Joseph Chrisnel Alcine
Jose Azemar
.... and many more....

Morris lab, Kstate
Buckler lab, Cornell
Univ Laval, Canada
CIRAD,France

Other emerging pests and diseases that we work on

- SCA resistance in photoperiodic sorghum
- Witches broom (phytoplasma) in Pigeonpea (*Cajanus cajan*)
- *Phytophthora colocasiae* on Taro (*Colocasia esculentum)*
- Defensive breeding for the Cassava African mosaic viruses

And hope to replicate our sorghum success..

Thanks to our donors

Establishment of our sorghum breeding program and our rapid cycling strategy with support from CIRAD and funding from the French Agence Nationale de la Recherche (appel Flash Haiti)

agap

cirad

PROJET FINANCÉ PAR L'ANR - PROJECT FUNDED BY THE ANR

Development and release of *Papèpichon*, the first Haitian SCA resistant variety, with support of Akosaa and funding from Canada Global Affairs

UNIVERSITÉ LAVAL

Ogmante Sekirite Alimantè an Ayiti · Kapasite pou · Amelyorasyon AKOSAA

Canada

REPUBLIQUE D'HAITI - REPIBLIK DAYITI

Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural

Ministè lagrikilti Resous Natirèl ak Devlopman Riral

BID

Characterization of HBP genetic diversity and Mapping of the SCA resistance locus

Program activities are funded by the United States Agency for International Development (USAID) under Cooperative Agreement No. AID-OAA-LA-16-00003.

Collaborative Research on Sorghum and Millet

FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

USAID FROM THE AMERICAN PEOPLE

Dr. Robert Bertram, Chief Scientist, USAID Bureau for Resilience and Food Security

Rob Bertram is the Chief Scientist in USAID's Bureau for Resilience and Food Security, where he serves as a key adviser on a range of technical and program issues to advance global food security and nutrition. In this role, he leads USAID's evidence-based efforts to advance research, technology and implementation in support of the U.S. Government's global hunger and food security initiative, Feed the Future. He previously served as Director of the Office of Agricultural Research and Policy in the Bureau for Resilience and Food Security, which leads implementation of the Feed the Future research strategy and related efforts to scale innovations in global food security efforts, working with a range of partners. Prior to that, he guided USAID investments in agriculture and natural resources research for many years. Dr. Bertram's academic background in plant breeding and genetics includes degrees from University of California, Davis, the University of Minnesota and the University of Maryland. Before coming to USAID, he served with USDA's international programs as well as overseas with the Consultative Group on International Agricultural Research (CGIAR) system.

Dr. Angela Records, Science Advisor and Research Community of Practice Deputy Lead, USAID Bureau for Resilience and Food Security

Dr. Angela Records is a Science Advisor at the United States Agency for International Development (USAID) in the Bureau for Resilience and Food Security (RFS), where she manages U.S. university-led plant disease, crop improvement, and postharvest handling research programs. Dr. Records holds a B.S. in Biology from Baylor University, an M.S. in Biology from the University of Nevada, Las Vegas, and she earned her Ph.D. in Plant Pathology from Texas A&M University, where she studied plant-pathogen interactions. After completing her doctoral studies, Dr. Records accepted a postdoctoral appointment at the University of Maryland in the Maryland Pathogen Research Institute, where she studied the molecular mechanisms controlling biofilm formation by the human bacterial pathogen *Pseudomonas aeruginosa*. In 2012, she was selected as a Scholar Fellow for the *Think, Write, Publish* science communications program and a Science Policy Fellow with the American Phytopathological Society. Dr. Records serves as the Deputy Lead of the RFS Research Community of Practice.

FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Intended new activity design:
Feed the Future Innovation Lab for Current and Emerging Threats

Rob Bertram and Angela Records, USAID/RFS
October 21, 2020

USAID
FROM THE AMERICAN PEOPLE

The challenge of current and emerging threats

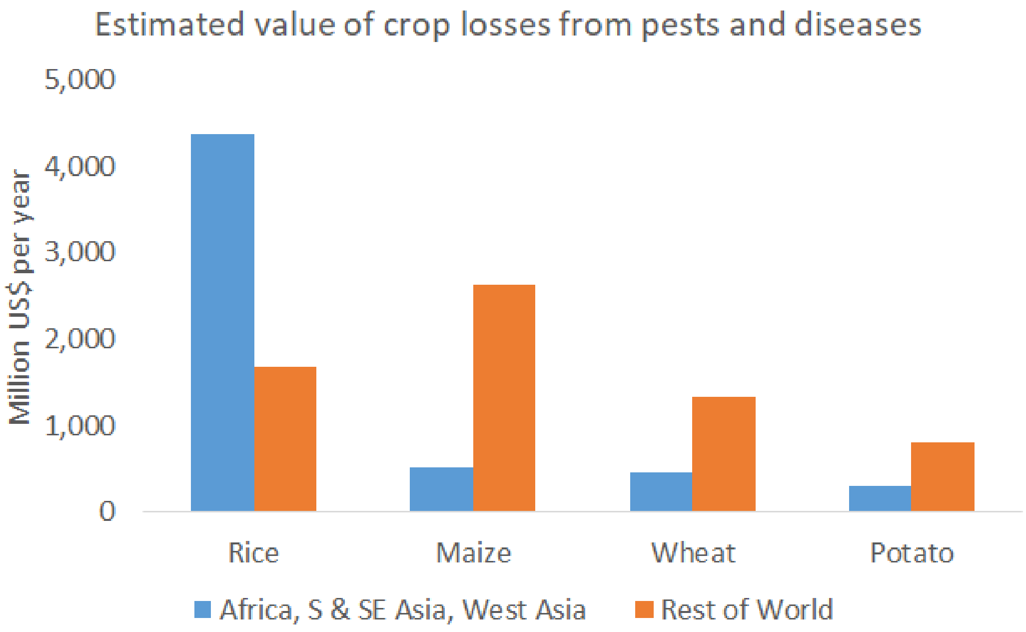
In general:

- Diversity of challenges
- Limited effective, safe and environmentally sound management and control strategies
- Emergence of new threats – challenging to predict and plan for

In countries with strong reliance on agricultural production for food security:

- Potential for greater relative costs due to dependence on agriculture
- Greater burden on government supported agricultural systems

Crop pests and diseases represent a significant economic burden in developing countries



Source: Savary et al (2019)

CIMMYT

Fall Armyworm

Barbara Valent, KSU

Wheat Blast

10 Years of Feed the Future: Emerging Threats

Florence Sipalla/CIMMYT

Maize Lethal Necrosis

Angela Records, USAID

Fusarium Wilt

The role of research in achieving global food security

GFSA. U.S. food security investments should "harness science, technology and innovation"; emphasizes diverse research partnerships.

GFSS. Research "…ensure[s] a pipeline of innovations, tools and approaches designed to improve agriculture, food security, resilience and nutrition priorities in the face of complex, dynamic challenges."

GFS Research Strategy. Sets research priorities; Details how research will contribute to high-level food security & development objectives.

Addressing current and emerging threats to crops with research

- Responds to the GFSA research strategy
- Builds on past lessons learned (IPM Innovation Lab and others)
- Opens the door to a new consultative design process that incorporates learning to date and that considers the current pace of emerging threats and the challenges of existing issues

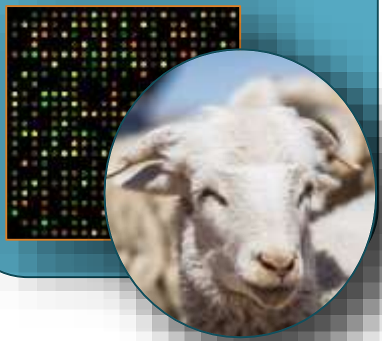
Core operating principles for GFS research investments

- Embrace **purpose-driven** research
- Generate and sustain global public goods
- Leverage data to accelerate research impacts
- Continuous learning, adaptation, and communication through monitoring and evaluation
- Promote empowerment and equitable participation in science
- Strengthen agricultural innovation systems
- Orient research efforts to support technology scaling

The FtF agricultural research portfolio

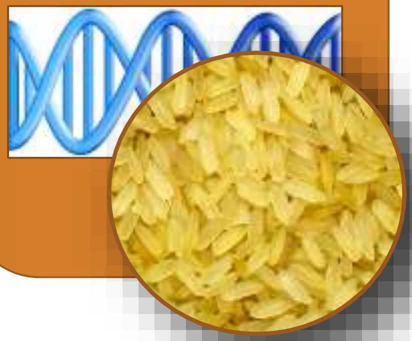
FtF Innovation Labs

- US University-led
- Diverse research themes
- Sub-awards to national partners and others



CGIAR

- Diverse research, scaling programs
- Sub-awards to national partners



Other

- Public-private partnerships
- Capacity development & training programs
- Seed systems

Mission-Funded

- Targeted awards advance country/ region-specific objectives
- Ag value-chain, technology-scaling, capacity support programs
- Sometimes support existing programs

FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Feed the Future Interagency Working Group on Research

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USDA
United States Department of Agriculture

NIH
National Institutes of Health

Department of Commerce, United States of America

Department of State, United States of America

Department of Defense, United States of America

The Department of the Treasury, 1789

Executive Office of the President of the United States

NSF

United States African Development Foundation

USGS
science for a changing world

DFC
U.S. International Development Finance Corporation

Peace Corps

Millennium Challenge Corporation
United States of America

Timeline and process for **CETC Innovation Lab** creation

Consultations:

- Webinars
- Focus groups
- Discussions

White Paper: October / November 2020

Proposal Phase:

- Solicitation release date November 2020
- Award June 2021

Current and Emerging Threats to Crops Innovation Lab Design Team

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Thank you!

Q&A...