



Smart Surveillance and Integrated Response to Maize Lethal Necrosis (MLN) in Eastern and Southern Africa

A global model to stop transboundary plant disease threats and secure Africa's future harvest.

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CIMMYT

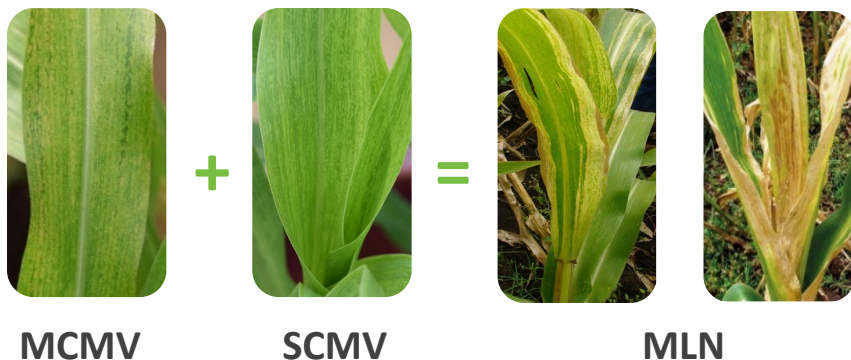


Maize Lethal Necrosis (MLN)

Maize Lethal Necrosis (MLN) was first reported in Kenya in September 2011, and since then reported in 6+ countries in eastern Africa.

MLN is a viral disease caused by combined infection of maize with **Maize Chlorotic Mottle Virus (MCMV)** and any of the **Potyviruses**, especially **Sugarcane Mosaic Virus (SCMV)**.

MLN Disease Symptoms



The Risk

- Threatens Food Security: Over 300 million people rely on maize.
- MLN causes 80-100 % yield losses in affected zones.
- Spreads fast: Already in 7 African countries.
- Without containment, MLN threatens food security, trade, and farmer livelihoods.

MLN IPD-Management Strategy



Precision Diagnostics & Surveillance

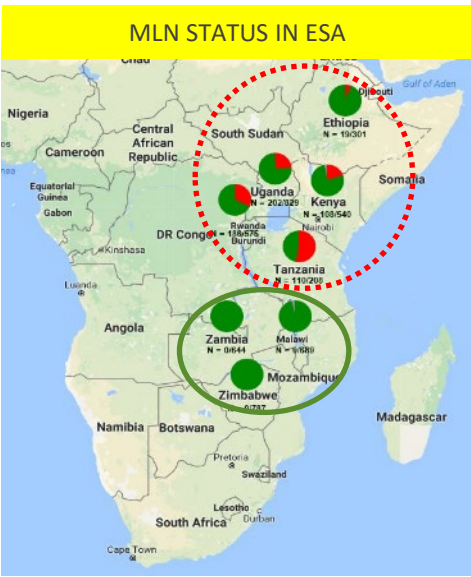
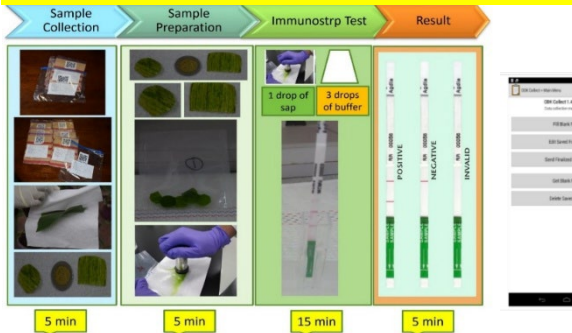
Smart Surveillance: In partnership with NPPOs, we have contained the Maize Chlorotic Mottle Virus (MCMV) and successfully prevented the spread of MLN beyond endemic zones in several countries including southern Africa.

Containment Success: No Spread to New Countries Since 2016.

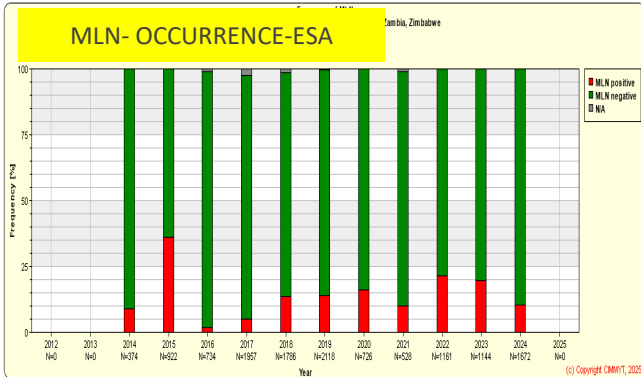
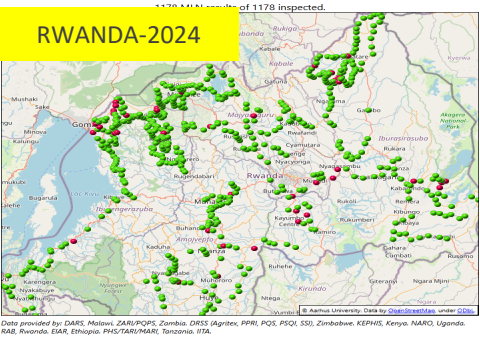
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METHODOLOGY



- **Optimized MCMV diagnostic protocols:** Integrated immunostrip testing into real-time mobile data capture.
- **Trained NPPOs, SMEs, and NAREs** on rapid MCMV diagnosis and real-time disease surveillance.
- **Updated and maintained MLN surveillance data** on the centralized MLN web portal.



Preventing MLN Across Borders: Digital Innovations for Biosecure Maize Trade in Africa

Safe germplasm exchange and distribution from Kenya to other countries with following stringent practices

Smart certification and MLN-Free Seed Movement

- Strengthened MLN containment through seed health testing, certification, and quarantine.
- Maize Seed Treatment Prototype: Treated ~8,000 lines to ensure virus-free seed.

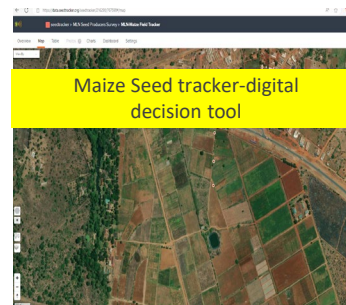
Seed treatment prototype unit



Quarantine facility, Mazowe

Capacity Building & Tools for Clean Seed

- 10+ years training seed producers, extension agents, inspectors in MLN-free seed production.
- Launched **Maize Clean Seed Production Tracker** to standardize steps.
- 12-Step MLN-free protocol.

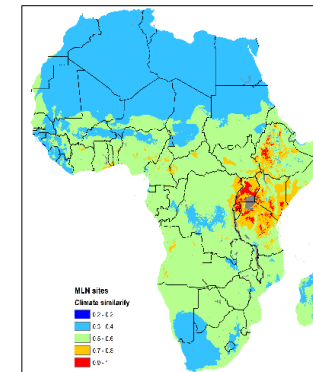


<https://data.seedtracker.org/login>

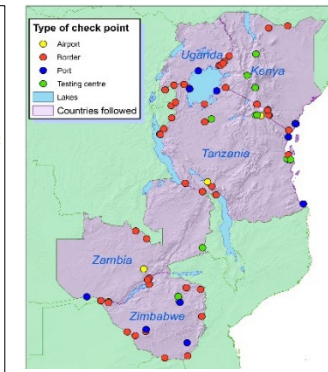


Transboundary risk and need for regional action

CLIMATE MODELLING IN ESA FOR MLN



TRANSBOUNDARY POINTS IN ESA



Inadequate Infrastructure & High Risk:

- Inadequate infrastructure: Limited quarantine sites, weak policies, and poor coordination.
- High-risk transboundary zones: Kenya, Uganda, Tanzania, Ethiopia, Zimbabwe.
- Climate & pest maps show urgent need for regional surveillance & cooperation.

Capacity Building, Communication Outreach to Combat MLN Sustainably

Building a Smart MLN Community of Practice in ESA: Strengthening Diagnostics, Surveillance, Phenotyping, Agronomic Management for MLN-free seed production and Knowledge Sharing for Sustainable Plant Health

Training and Education:

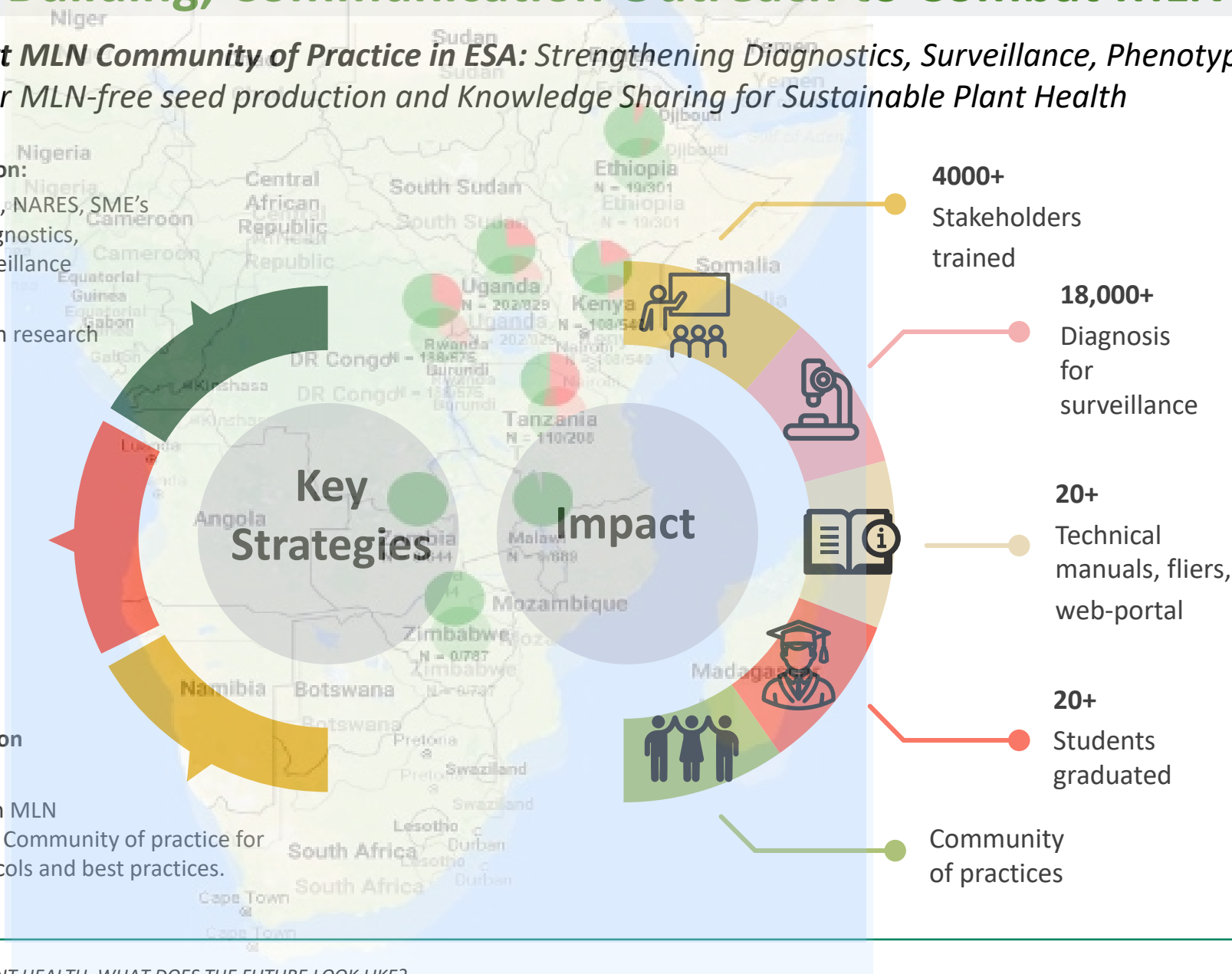
- Strengthened NPPO's, NARES, SME's capacity for MLN diagnostics, monitoring, and surveillance across Africa.
- Supported students in research for higher education.

Knowledge Sharing:

Disseminated MLN management practices through the MLN web portal.

Communication Outreach:

Established an MLN phytosanitary Community of practice for sharing protocols and best practices.



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Maize Lethal Necrosis (MLN): A Technical Manual for Disease Management

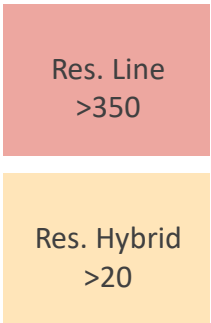
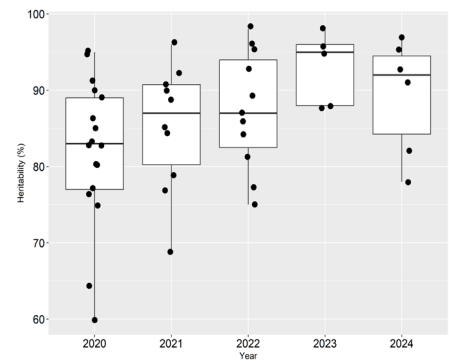
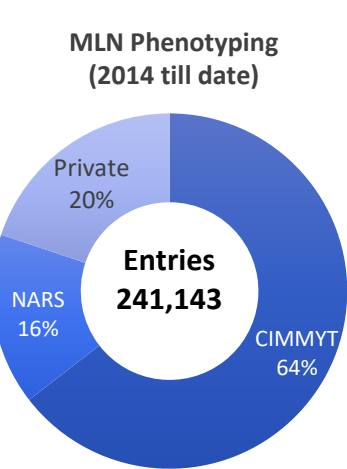


For more details:
mln.cimmyt.org

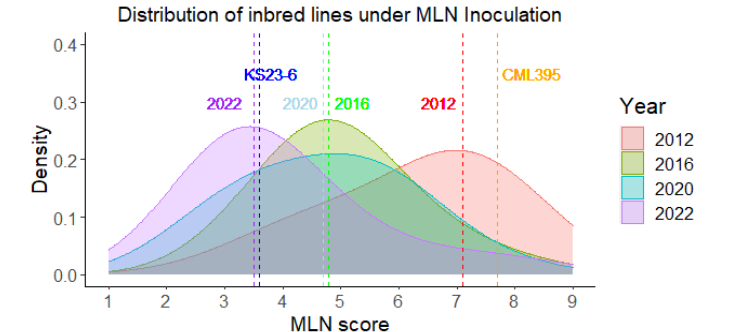
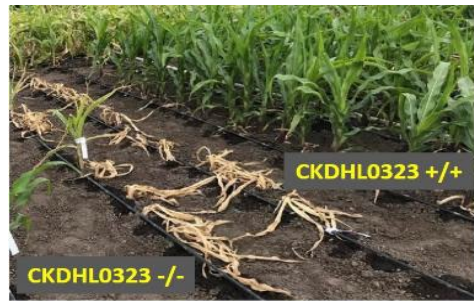
From Lab to Field: Smart Breeding for MLN-Resistant Maize for Africa

Maize Lethal Necrosis (MLN) Screening Facility for Public-Private Partnerships: A state-of-the-art platform for phenomics and big data-driven development of MLN resistant maize varieties, precisely tailored to diverse agro-ecologies.

1. SCALE: A World-Leading MLN Screening Platform



2. Technology & Tools: Powered by Genomics, Phenomics, and Big Data



- ### 3. From Discovery to Deployment
- Resistant hybrids yield 6–8 t/ha
 - Tolerant hybrids yield 4–5 t/ha
 - Susceptible hybrids fail in MLN zones



Resistant

Tolerant

Susceptible

From Regional Success to a Global Model: Opportunities Ahead

Scale up smart surveillance tools: to protect vulnerable regions and monitor MLN in real time.

Foster cross-border collaboration and data sharing: to prevent transboundary outbreaks.

Leverage on cutting edge technologies in breeding for MLN resistance: Leverage cutting-edge technologies in breeding, AI, and early-warning diagnostics to future-proof maize systems.

Strengthen farmer education and local capacity: through national extension systems and digital advisory.

Advance sustainable MLN management programs built on genetic resistance and agronomic best practices.

Our goal: A resilient, MLN-free Sub-Saharan Africa that serves as a global model for managing plant health threats.

Acknowledgements:



Thank you