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# Maize Lethal Necrosis - The growing challenge in Eastern Africa

**Report Categories:**
Agricultural Situation
Grain and Feed

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**Report Highlights:**
The spread of Maize Lethal Necrosis (MLN) in the maize growing regions of Eastern Africa has intensified since the first outbreak was reported in September 2011 in Kenya. FAS/Nairobi estimates that the disease will reduce Kenya's estimated maize production by about 10% during the 2014/2015 marketing year. The Government of Kenya (GOK), and the national, regional and international research organizations have commenced initiatives to mitigate the spread and adverse impact on food security. United States Department of Agriculture (USDA) through the Agricultural Research Service (ARS) is providing technical support to the tolerance screening initiative, and capacity building for scientists under the Borlaug Fellowship Program (BFP).

**Maize Lethal Necrosis**

Maize Lethal Necrosis (MLN), also known as Corn Lethal Necrosis (CLN), is a result of a combination of two viruses, the Maize chlorotic mottle virus (MCMV) and any of the cereal viruses in the Potyviridae group, like the Sugarcane mosaic virus (SCMV), Wheat streak mosaic virus (WSMV) or Maize dwarf mosaic virus (MDMV).

The first outbreak of MLN was reported in 2011 in Bomet County in the South Rift-Valley Region Kenya. The disease has since been identified in other counties in the main maize growing areas. The disease has also been reported in the other East African Community countries, as well as in the Democratic Republic of Congo (DRC), South Sudan and Ethiopia. Some projections based on the current situation indicate that MLN could spread and intensify across Africa by 2020 which would result in a more significant impact on food security in the region.

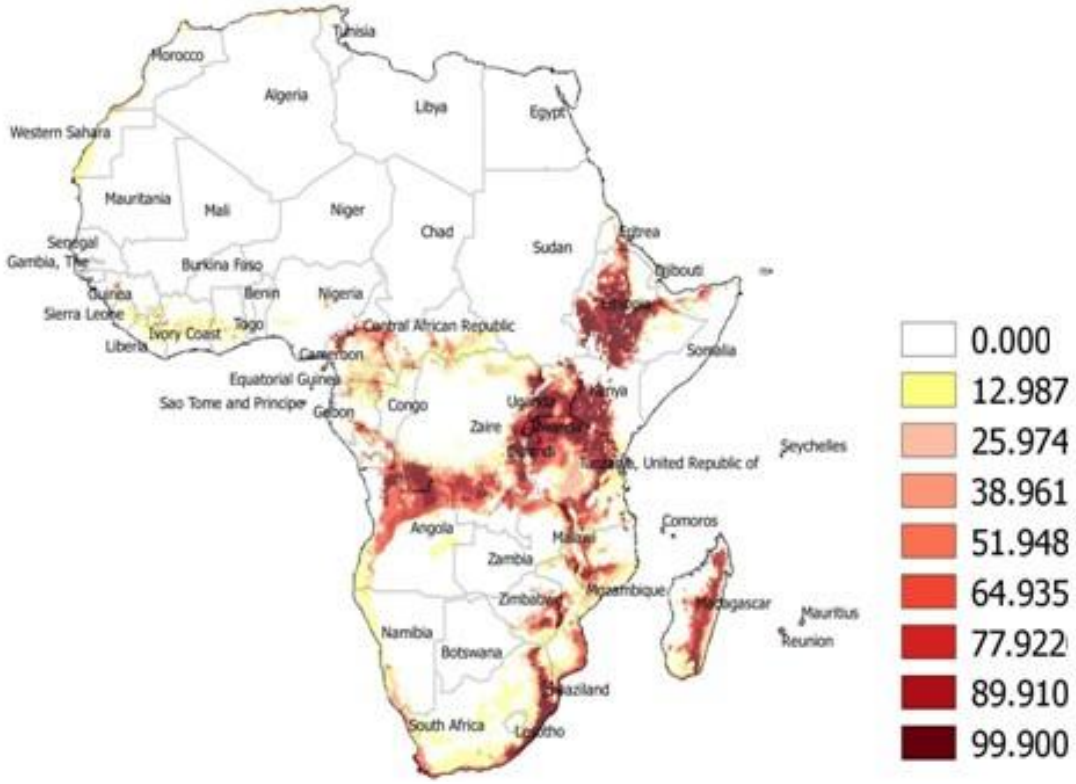
**Timelines of initial observation**

| Country | Month/Year of initial observation |
|---|---|
| Kenya | September 2011 |
| Tanzania | August 2012 |
| Uganda | October 2012 |
| South Sudan | January 2013 |
| DR Congo | March 2014 |
| Ethiopia | June 2014 |

**Source: Melanie Edwards, BFS/ARP, USAID**

In Kenya, a field survey by FAS/Nairobi in October 2014 indicated no continuous pattern of MLN spread across the maize growing regions. For instance, although the disease has intensified in Bomet County, in the neighboring Kericho Country, the epicenter of the disease is in Kipkelion Subcounty, which does not share a border with Bomet. During the 2014 long rains, high prevalence of MLN was reported in the South and North Rift-Valley regions of Kenya (in the counties of Narok, Bomet, Nakuru, Nandi, Uasin Gishu, Elgeyo Marakwet, and Transzoia, Kericho). Low prevalence was reported in Central, Western, and Eastern regions of Kenya. According to the agricultural extension staff in the counties, MLND has spread to higher altitudes contrary to earlier perceptions the disease was only prevalent in lower warmer areas.

**Projected Suitability of MCMV and potential risk of MLN across Africa by 2020, using Agro-ecological Niche Modelling**




**Source: Melanie Edwards, BFS/ARP, USAID**
*Darker colors (higher Index) indicates higher suitability and risk for MLND

## Impact on Maize Production

Maize is the primary staple food in Kenya (and the rest of East and Central Africa) and any disruption of production invariably weakens food and nutrition security for a large section of the population. In Kenya, the adverse impact of MLN is already apparent at farm, county and national levels. At the farm level, affected famers have experienced total crop loss. The situation is further aggravated by the unavailability of the residual foliage to livestock due to fears of fungal poisoning.

At the national level, FAS/Nairobi estimates that the disease has affected about 60,000 hectares leading to a 10% drop of the previously estimated 2014/2015 production. The prevalence and impact of the disease would have been higher if some farmers in the primary main maize growing areas of North Rift-Valley had not changed to other crops such as wheat due to the late onset of the rains in the 2014 planting season.

| Impact of MLN in some key counties | | | | | |
|---|---|---|---|---|---|
| County | Planted Area (Ha) | Area affected by MLN (Ha) | Area affected by MLN (%) | Estimated Production Loss (Bags) | Estimated Loss (US $) |
| Uasin Gishu | 91,675 | 3,120 | 3% | 151,460 | 5,048,665 |
| Trans Nzoia | 100,390 | 11,784 | 12% | 471,379 | 15,712,650 |
| Nandi | 69,810 | 307 | 3% | 9,209 | 306,977 |
| Narok | 79,651 | 11,645 | 15% | 290,489 | 9,682,974 |
| Nakuru | 83,744 | 4,807 | 6% | 131,985 | 4,399,499 |
| Elgeyo Marakwet | 27,666 | 4,011 | 14% | 64,696 | 2,156,523 |
| Kericho | 37,378 | 6,544 | 18% | 248,676 | 8,289,193 |
| West Pokot | 33,870 | 6,149 | 18% | 78,147 | 2,604,916 |
| Laikipia | 34,895 | 239 | 1% | 8,574 | 285,797 |
| Bomet | 25,134 | 5,741 | 23% | 47,671 | 1,589,038 |
| Total | 584,213 | 54,347 | 9% | 1,502,286 | 50,076,232 |

**Source: Departments of Agriculture- Respective Counties/FAS-Nairobi Estimates**

## Mitigation Measures

Since the outbreak, and given the lack of definite management strategies, several initiatives have been put in place.

### *Government response*

In 2012, the Government of Kenya (GOK) initiated several activities aimed at understanding the dynamics of the disease and containing the spread and impact of the disease, including:

- Formation of a task force and monthly technical consultative forum,
- Increasing surveillance on MLN spread,
- Sensitization of farmers.

Although agriculture is a devolved function in Kenya, most county governments are at their formative stage and do acknowledge their lack of capacity to manage the challenges brought about by MLN.

### *Farm level*

Farmers view MLN as a "sudden phenomenon that cannot be explained". In Bomet for instance, the disease has been christened 'Koroito' (plague in English translation). Agricultural extension staff, on the other hand are at a loss to explain to farmers the causes of the disease, or propose any definite management solution.

Some of the suggested solutions include,

- Observance of a closed season – this has been difficult in view of the small farm sizes in most of the maize growing regions.
- Abandonment of maize farming and diversification into alternative crops – unfortunately maize is so engrained in the food culture of many of the affected communities and this advice has largely been ignored.
- Chemical spraying targeted at controlling the disease vector.
- Uprooting and destruction of affected plants.

- Early planting – some of the extension personnel indicated that early planting allows the crop escape infection – this needs verification through scientific research.

***Seed maize***

Although the spread of MLN through seed is still a matter of conjecture, various seed companies operating in the Kenya have intensified fungicide seed dressing in an attempt to reduce the spread of the disease. The effectiveness of this strategy still needs to be scientifically verified.

***Research initiatives***

The agricultural research community has also responded in various ways. The Kenya Agricultural and Livestock Research Organization (KALRO) and the International Center for Maize and Wheat Improvement (CIMMYT) have set up a MLN screening facility at the Naivasha Research Station, Nakuru County. The facility began operations in September 2013 and research scientists have since developed standard operating procedures for inoculation and isolation and are currently optimizing a high-throughput screening methodology. Virology experts from the Agricultural Research Service (ARS), an agency of the United States Department of Agriculture (USDA), are also providing technical support to the initiative.

In addition, USDA through FAS/Nairobi prioritized MLN for its 2014 Borlaug Fellowship Program. Under the program, four scientists (2 from Kenya, 1 from Uganda and 1 from Tanzania) are currently undergoing training at Ohio State University in collaboration with ARS virology group.

***Other initiatives***

At the regional level, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) has facilitated a multi-sectoral strategy with six priority areas:

a) Diagnostics and Epidemiology
b) Breeding for MLN Resistance
c) Integrated Management of MLN
d) Phytosanitary Measures and Regulations
e) Seed Production and Delivery
f) Information and Knowledge Management

The East African Community (EAC) secretariat has also developed the "Prevention and Control of Maize Lethal Necrosis Disease in the EAC Region" strategy.

**Conclusion**

The rapid spread of MLN in the Eastern African Region and the potentially enormous threat to food security and trade has aroused the interest of governments, national and global research organizations, and the private sector, culminating in several initiatives. While several short-term interventions have been suggested, the more sustainable long-term solution appears inclined towards the development of MLN resistant maize varieties. The success of this endeavor calls for a facilitative legal and policy environment including explicit governmental support for deployment of modern breeding techniques, including the use of biotechnology.

**Information Sources**

- Departments of Agriculture in the Kenya's counties of Bomet, Uasin Gishu, Elgeyo Marakwet Nandi, West Pokot, Trans-nzoia, Kericho, Nakuru, and Laikipia.
- Ministry of Agriculture, Livestock and Fisheries, Kenya
- Melanie Edwards, BFS/ARP, USAID
- Peg Redinbaugh, USDA/ARS
- FAS/Nairobi crop survey undertaken between from October 27 - November 1, 2014