

Maize Lethal Necrosis (MLN): A New Disease of Maize in Uganda

A new disease of maize that appeared in the farmers' fields in Kenya in 2011 has since spread to Uganda. This disease can cause up to 100% loss hence threatening food security and income. The disease is difficult to control for two reasons:

1. It is caused by a combination of two viruses.
2. The vectors that transmit the disease-causing viruses may be carried by wind over long distances.

There is a concerted effort by national and global research and extension organizations, laboratories, and seed companies to control the spread of the disease and, to develop and urgently deploy disease-resistant maize varieties for farmers

What causes MLN?

The disease was first identified in the USA in 1976 (Niblett and Claflin 1978). MLN is caused by the double infection of maize plants with Maize chlorotic mottle virus (MCMV) and any of the cereal viruses in the Potyviridae group, such as Sugarcane mosaic virus (SCMV), Maize dwarf mosaic virus (MDMV), or Wheat streak mosaic virus (WSMV). MCMV or SCMV produce milder symptoms when they infect maize alone; in combination, these two viruses rapidly produce a synergistic reaction that seriously damages or kills infected plants.



Sugarcane
Mosaic Virus
(SCMV)



Maize Chlorotic
Mottle Virus
(MCMV)



Maize Lethal
Necrosis Disease
(MLND)

Chronology of MLN occurrence

Kenya:

- In September 2011 an unknown disease was reported in Bomet county the South Rift province of Kenya
- In early 2012, the disease was observed to five other districts in the rift valley, parts of eastern and central provinces, Trans-Nzoia, Uasin Gishu, and Busia.
- It has since been reported in Tanzania and Rwanda

Uganda:

- By October 2012, farmers and extension officers in Busia reported a strange disease in their fields
- A verification visit was made by a team from NaCRRI.
- Typical symptoms of MLN were observed fields in boarder districts of Busia and Tororo
- Mostly late planted crops severely infected
- Season was characterized with extended rains up to January
- Farmers' story in Sikuda and Buteba sub-counties in Tororo and Busia respectively were similar – first heard about it from Busia in Kenya
- Disease incidences greater than 30% observed in infected fields
- New reports in Iganga, Mbale, Sironko and Bulambumbuli



Symptoms of infected maize plants in farmers' fields

Understanding the disease

A team of researchers from the National Agricultural Research Organization (NARO) and experts from The Ohio State University/USDA have collected samples from infected fields where the disease has been reported. This activity is on-going and the samples have been taken to US for testing by serology and molecular methods for the presence of MCMV and SCMV at USDA-ARS/OARDC, Wooster. The results obtained will not only indicate the virus components of MLN but also their similarity to those identified in Kenya and other places.

What are the typical symptoms?

- Mild to severe mottling on the leaves, usually starting from the base of young leaves in the whorl and extending upwards toward the leaf tips.
- Stunting and premature aging of the plants.
- Dying (known as “necrosis”) of the leaf margins that progresses to the mid-rib and eventually the entire leaf.
- Necrosis of young leaves in the whorl before expansion, leading to a symptom known as “dead heart” and eventually plant death.
- Premature drying of cobs and tip die-back result in no pollen production and subsequently poorly filled cobs.



Premature drying of cobs



Leaf necrosis and dead heart



Diffuse mosaic symptoms



Whole field infected with MLN

How can MLN be controlled?

Based on MLN management experiences in the USA, rigorous disease management practices in seed production plots, including use of resistant varieties, controlling weeds/alternate hosts, keeping unnecessary machines/ people out of the field, controlling insect-vectors using appropriate insecticide (at weekly intervals), and having adequate isolation from MLN-infected fields, can prevent the spread of the disease. Because individual plants with MCMV or SCMV alone show milder symptoms, seed production fields must be carefully inspected and plants that appear infected removed immediately.

How can farmers prevent MLN in their fields?

- Plant certified seed produced from MLN free areas
- Rotate maize with non-cereal crops like beans, sweet potato, sunflower, Irish potato.
- Do not plant a new maize crop near an infected field. Wind-blown insect vectors can transmit the disease from the infected field to the new crop.
- Plant maize at the onset of the main rainy season, rather than during the short rain season; this creates a break between maize crops and interrupts the disease cycle.
- Scout fields at least once a week to identify diseased plants
- Uproot and burn all plants showing symptoms immediately
- Do not move diseased plant materials far from the field
- Weed fields regularly to eliminate alternate hosts for insect vectors, especially grasses.
- Boost plant growth and vigor by: planting at onset of rains, applying manure, basal and topdressing fertilizers
- Control insect-vectors using appropriate insecticide. Treat seed with Imidacloprid 350 g/L (Gaucho) , followed by insecticide spray with Imidacloprid 100 g/L + β -cyfluthrin 45 g/L (Thunder) at the rate of 0.3 l/ha starting at 1 or 3 weeks after emergence (WAE).
- Use maize varieties that are resistant to MLN (these are currently not available).

For more information, please contact:

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