

Maize lethal necrosis (MLN) disease: symptom recognition and management



Agriculture Productivity Program for Southern Africa (APPSA)



Malawi



Zambia



Mozambique

Introduction

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 typically 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. Infection rates and damage can be very high, seriously affecting yields and sometimes causing complete loss of the crop. If the crop is affected earlier they dry before tasselling. When affected late, plants are frequently barren; ears formed may be small or deformed and set little or no seed. Although the disease has not been detected in Zambia/Mozambique/Malawi, it is present in neighbouring countries; Tanzania, and the Democratic Republic of the Congo, and also in Kenya, Uganda, Rwanda and Ethiopia.

Economic impact

Infection rates and damage can be very high, seriously affecting yields and sometimes causing complete loss of the crop. Infected plants are frequently barren; ears formed may be small or deformed and set little or no seed.

Symptoms

Infected plants show a diverse range of symptoms depending on; germplasm, time of infection, prevailing environmental conditions, ratios of the viruses infecting the plant and agronomic management of the field. The symptoms can be observed on all above ground parts of the plant (leaves, stem tassels and cobs). The symptoms are observed on plants as early as 2 weeks after germination up to cob formation stage.

Symptoms on leaves

Early symptoms of infection on the leaf are characterized by mild streaking, mosaic and mottling patterns usually starting from the base of the young leaves in the whorl and extending upwards toward the leaf tips (Fig. 1 & 2).



Fig 1: Chlorotic mottle on leaves

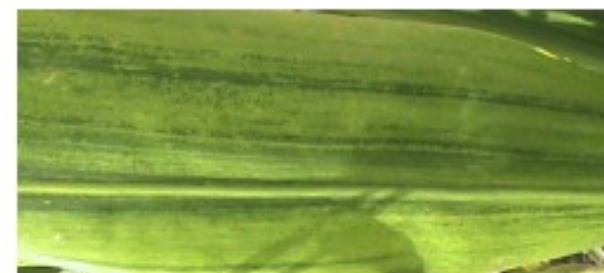


Fig. 2: Chlorotic mottle on leaves – parallel to mid vein

This is followed by advanced and severe mottling, chlorosis, shortened internodes, dwarfing and necrosis of young leaves in the whorl (Fig. 3) before expansion leading to a 'dead heart' symptom (Fig 4) and eventual plant death (Fig 5).



Fig 3 Advanced symptoms mottling, chlorosis



Fig. 4: Severe chlorosis and necrosis of leaves and dead heart



Fig. 5: Eventual plant death

Symptoms on flowering parts and ears

Tassel blasting and sterility (No pollen produced). There is premature drying of cobs (Fig. 6), and mosaic symptoms on ear husks with poorly filled cobs (Fig. 7) or no grain filling.



Fig. 6: Premature drying of cobs



Fig. 7: Poor or no grain filling

How is Maize lethal necrosis disease spread?

Maize plants are susceptible to MLN at all stages in their growth, from seedling to maturity. Insect vectors transmit the MLN-causing viruses from plant to plant

and field to field. MCMV is carried by thrips and beetles and SCMV by aphids. Transmission via seed from infected plants is normally very low (0.4%). Virus can persist in infected overwintering crop residue.

Management of MLND

- ◆ Rigorous disease management practices in seed production plots and fields through careful inspections and removal of plants that appear infected.
- ◆ Plant/Use of resistant/tolerant where available.
- ◆ Controlling weeds/alternate hosts.
- ◆ Keeping unnecessary implements/people out of the field.
- ◆ Controlling insect-vectors using appropriate insecticide (at weekly intervals).
- ◆ Adequate isolation from MLN-infected fields, can prevent the spread of the disease.

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