

Maydis Leaf Blight (MLB): An Important Disease of Maize

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INTRODUCTION

Maydis leaf blight (MLB) is an important disease of maize which is caused *Bipolaris maydis* and is reported from most maize growing regions of the world including India. It is also known as southern corn leaf blight (SCLB). The occurrence of any disease depends on environmental prevailing that time, cultural practices and hybrid that is under consideration. It can be most serious and dangerous disease in warm or wet temperate and particularly in tropical areas where yield losses go upto 70 percent due to the disease. The production of spore of this disease is influenced mainly by temperature present. The infected tissues are covered with spots and chlorosis due to it can render them non-productive. It is found to have a highly saprophytic ability and primary inoculum level that found in areas with high disease occurrence.

Scientific classification

Kingdom:	Fungi
Division:	Ascomycota
Subdivision:	Pezizomycotina
Class:	Dothideomycetes
Order:	Pleosporales
Family:	Pleosporaceae
Genus:	<i>Bipolaris</i>
Species:	<i>B. maydis</i> (Cochliobolus heterostrophus)
Binomial name:	<i>Bipolaris maydis</i> Nisikado & Miyake

Distribution

Jammu & Kashmir, Himachal Pradesh, Sikkim, Meghalaya, Punjab, Haryana, Rajasthan, Delhi, Uttar Pradesh, Bihar, Madhya Pradesh, Gujarat, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu.

Symptoms

The symptoms “O” strain of the fungus appears as young small and diamond type shaped lesions. As they mature, they elongate. The growth is limited by adjacent veins and final lesion shape is rectangular and 2-3 cm long. Lesions may coalesce, producing

complete burning type large areas of the leaves, where as “T” strain can cause severe injuries to maize varieties in which Texas source of male sterility incorporated. Lesions produced by the T strain are oval and larger than those produced by the O strain.



Hosts

The primary host of southern corn leaf blight is maize crop also known as corn in the US. The various types of corn having normal cytoplasm (N) are more vulnerable to Race O. They have cytoplasm resistance to T-toxin of *Bipolaris maydis* (produced by Race T). The absence of gene is available only in plants with Texas male sterile cytoplasm is

reason for resistance. Corn plants with T-cms cytoplasm have maternally inherited the gene T-urf 13 which encodes for a protein component of inner mitochondrial membrane. T-toxin acts on that portion of the mitochondria. Similarly, Race C is only pathogenic to the hosts with cytoplasm male-sterile C. SCLB can also be infected sorghum and teosinte crop.

Race Overview

Race/ toxin produced	Susceptible Host
Race O / O-toxin	Maize with normal cytoplasm (N)- most maize plants
Race T / T-toxin	Maize with Texas male sterile cytoplasm (T-cms)- these plants have gene T-urf 13, which encodes for T-toxin's site of action
Race C / C-toxin	Maize with cytoplasm male sterile C (C-cms)- currently found only in China

Favourable Conditions

MLB favours warm and moist conditions for development. Late sowing, high humidity (>80%) and temperature of 25 ± 2°C favours the development of disease. The extended moist conditions are essential for fungi to germinate quickly and effectively. Highly dense maize with minimum tillage are good for spread of its spores that can easily be blown from one plant to another plant.

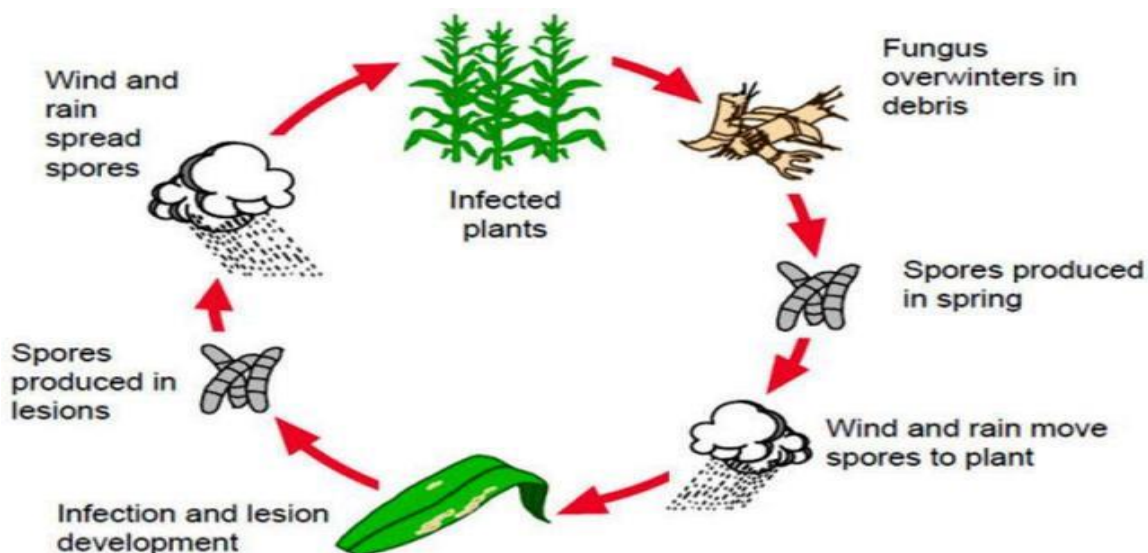
Disease Cycle

The disease cycle of *Bipolaris maydis* is polycyclic and releases either asexual conidia or sexual ascospores to infect the maize plant. The asexual cycle is also known to occur in nature. Under favourable moist and warm conditions available, the conidia (the primary inoculum) are released from lesions of an infected plant and carried to nearby present plants via splashing rain or wind. Once conidia

have occurred on the leaf or the sheath of a healthy plant, *Bipolaris maydis* will germinate on tissue by way of polar germ tubes. The germ tubes either penetrate through leaf or enter through a natural opening known as the stomata. The parenchymatous leaf tissue is invaded by the mycelium of the fungus; the cells of the leaf tissue subsequently begin to turn brown and then collapse. These lesions give rise to conidiophores which then after getting favourable conditions; it can either further infect the original host plant (kernels, leaves, stalks, husks) or the release conidia to infect other nearby plants. The term 'favourable conditions' means that when water is present on surface of leaf and the

temperature of the environment is between 60 to 80 °F. Under these available conditions, spores germinate and penetrate into the plant in 6 hours. The fungus remains overwinters in the corn debris as mycelium and spores and waiting for these favourable spring conditions. The generation time for new inoculum is only 51 hours.

As the previously mentioned, *Bipolaris maydis* also has a sexual stage with ascospores, but this only observed in laboratory culture. Its ascospores are found only in the ascocarp *Cochiobolus*, a type of perithecium found rare in nature. Thus, the main route of SCLB infection is the asexual via conidial infection.



Management

1. Ploughing down of crop debris may reduce early infection and destroy the infected crop residue in the field.
2. Spray of Dithane M-45, Zineb @ 2g/litre water followed by 2 to 4 applications.
3. Soil application of *P. fluorescens* (or) *T. viride* @ 2.5 kg / ha + 50 kg of well decomposed FYM (mix 10 days before application) or sand at 30 days after sowing.
4. Rogue out affected plants.
5. Grow improved varieties