13. Annex: Regulated Pests

Didymella maydis

July 2023

Table of Contents

1. Technical description of the plague

1.1 Disease name Spanish: Tizón de las hojas amarillas del maíz (yellow leaf blight of corn)

1.1.1 Agent etiological

Preferred name: *Didymella maydis*, (Arny & R.R. Nelson) Qian Chen & L. Cai (2015)

Synonymy: *Didymella zeae-maydis*
Mycosphaerella zeae-maydis
Peyronellaea zeae-maydis
Peyronellaea maydis
Peyronellaea maydis
Phyllosticta maydis
Phoma zeae-maydis
Phoma maydis
Phoma maydis

Taxonomic categorization:

Class: Dothideomycetes
Subclass: Pleosporomycetidae
Order: Pleosporales
Family: Didymellaceae
Genus: *Didymella* Species:
Didymella maydis

1.2 Hosts / Species affected

Zea mays
Sorghum vulgare var. sudanense
Setaria spp.

1.3 Cycle of the disease

1.3.1 Transmission and survival

Transmission presumably occurs by seed that may be contaminated by infected plant debris in the soil. So far, the actual mode of infection in the field has not been investigated. Since the

fungus overwinters as immature pseudothecia on leaves, it has been suggested that ascospores may be responsible for early infection in the spring, while conidia are responsible for secondary infection in the growing season (Mukunya & Boothroyd, 1973). The fungus survives on crop debris, on which pseudothecia form (University of Illinois, 2022).

1.3.2 Incidence

According to Mukunya & Boothroyd, 1973, asexual reproduction is favored by light and high temperature with an optimum of 24ºC. In contrast, low temperatures and darkness favor the development of the sexual stage. According to the same authors, ascocarps were abundantly produced at temperatures between 18 and 21°C, while at 15°C few ascocarps developed, and at 24°C no pseudothecia were observed. At a temperature of 21°C most asci matured after 15 days of incubation in the dark.

In the United States, during the winter, numerous pseudothecia begin their development in decaying corn residues, but maturity does not occur until reaching 15 to 21°C in the spring (Mukunya & Boothroyd, 1973).

According to Castor *et al.* (1977), the fungus can infect susceptible corn lines after short periods of dew, with temperatures around 12 to 28°C, and there can be greater infection between 16 and 20°C if dew is not limiting. Spore germination depends on time and temperature, ranging from 50 % at 27 °C to 90 % at 15 to 18 °C. However, a large number of pycnidia are formed at temperatures between 18 and 27°C and about 95% of the spores germinate in about 5 hours under appropriate conditions. Also, over prolonged periods, spore germination and infection may be favored by low temperatures between 12 and 20 °C, while sporulation and colonization would be favored by temperatures between 20 and 27 °C. Disease may occur under less favorable temperature conditions, but in a more attenuated manner.

1.3.3 Symptoms associated with different organs and phenological stages

According to Arny & Nelson (1971), the fungus causes necrotic lesions and yellowing of leaf tissue. On lower leaves the lesions are rectangular to oblong-elliptic, usually 7-10 x 15-20 mm, occurring parallel to the veins, but not bounded by them. Lesions are yellow to beige, discolored in the center and commonly have a brown border. Leaves of

any age, and if the infection is severe, entire leaves will die, starting with the oldest ones. Lesions on the upper leaves are usually restricted by the veins and are therefore more linear. Lesions may also develop on the pod and husk of the ear, but are less obvious in this case. Young plants attacked by the fungus at an early stage of development may die or become stunted. Leaf sheath lesions may be similar to those of *Helminthosporium maydis* and differentiation may be difficult without fungal fruiting bodies. Dark pycnidia may be found in the central area of older lesions and, in nature, may be rare or absent.

1.3.4 Behavior and distribution in the batches

Little information is available.

1.3.5 Similarities with other pathogens

Symptoms caused by *Mycosphaerella zeae-maydis* can easily be confused with symptoms of *Helminthosporium maydis* and differentiation can be difficult without testing for fungal fruiting bodies.

In addition, the taxon *Mycosphaerella* (preferred name *Didymella)* is under re-evaluation due to the identification of numerous new species and the inclusion of new taxa (e.g., *Phoma*).

2. Bibliography

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3. Annex: Figures

Figure 1: Maize leaves inoculated with *Didymella zeae-maydis*. Arrows point to chlorotic zones (Condon *et al*., 2018).

Figure 2: Symptoms of *Didymella zeae-maydis.* Rectangular or oval chlorotic spots are observed, usually surrounded by a red or purplish margin. On older lesions, black spots are formed, which are the pycnidia. In severe and early infections the basal leaves become totally chlorotic and then die (University of Illinois Extension, S/F).

Figure 3: *Didymella zeae-maydis* symptoms on maize (*Zea mays*) leaves (La Guía Sata, S/F).

Figure 4: *Didymella zeae-maydis* symptoms in maize (*Zea mays*) crop (La Guía Sata, S/F).