
# 13. Annex: Regulated Pests

## *Stenocarpella macrospora*

**July 2023**

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*Zea Mays* with intended use propagation and purpose experimentation under a systems approach

# 1. Technical description of the plague

## 1.1 Disease name Spanish:

Podredumbre seca del maíz (dry rot of

maize)

### 1.1.1 Agent etiological

**Preferred name:** *Stenocarpella macrospora* (Earle) Sutton

**Synonymy:** *Diplodia macrospora*
*Macrodiplodia macrospora*
*Macrodiplodia zeae var macrospora*
*Stenocarpella zeae*

**Taxonomic categorization:**

| | |
|---|---|
| Class: | Sordariomycetes |
| Subclass: | Sordariomycetidae |
| Order: | Diaporthales |
| Genus: | *Stenocarpella* |
| Species: | *Stenocarpella macrospora* |

## 1.2 Hosts / Species affected

*Zea mays.*

## 1.3 Cycle of the disease

### 1.3.1 Transmission and survival

*Stenocarpella macrospora* is a necrotrophic fungus, whose cycle presents a parasitic phase when it infects developing maize plants and a saprophytic phase when its spores are found in the stubble (Da Silva Siquiera et al., 2014). The mycelium of this pathogen can be located inside the seed, making it a means through which *S. macrospora* can enter new areas where it was not previously present (Da Silva Siquiera et al., 2014; EPPO).

*S. macrospora* survives during the winter in corn stubble, in the form of pycnidia (remains of leaves, ears and canes) or in the seed, which constitutes the source of inoculum that generates the primary infection. In spring, with high humidity and temperature conditions the spores are dispersed by wind, rain and probably insects (Bermudez-Cardona et al., 2016; Da Silva Siquiera et al., 2014; EPPO; Wise et al., 2017). Maize plants are first affected at the mesocotyl, root, crown and node levels. Then the infection progresses to the stalk, with the vascular system being affected leading to a decrease in grain growth. This stage is favored by low humidity conditions in the environment at the beginning of the growth period, followed by periods of extensive rainfall after R1 (stigma emergence) (EPPO).

From R1 onwards, the spores of this pathogen can come into contact with the spikelets, causing infection at the rachis level, and then infecting the developing kernels, which end up rotting (Bermudez-Cardona et al., 2016; Da Silva Siquiera et al., 2014; EPPO; Wise et al., 2017). This phase will be favored by high levels of rainfall, from R1 to harvest, with the first weeks from R1 being those in which the ears will be most susceptible. Those hybrids whose kernels have finer pericarps will also be more susceptible. Other factors influencing disease severity are potassium deficiencies, poorly drained soils, mechanical or insect damage, and planting density (EPPO).

### 1.3.2 Incidence

In the work of Da Silva Siquiera et al. (2014) it is mentioned that seed transmission of this fungus is highly variable depending on the cultivar, environmental conditions and virulence of the pathogen. In that work, after inoculating two maize cultivars with this fungus, under controlled laboratory conditions, it was observed that the transmission of *S. macrospora* reached a maximum value of 85.8 %. In addition, it is mentioned that, under certain circumstances, transmission in cases where the disease behaves asymptomatically can reach a value of 6.9%.

Quantifying this parameter is also a complicated process since the presence of *S. macrospora* affecting maize is also linked to germination failure, asymptomatic plants and other fungi that also affect seeds. In addition, there is currently no specific growth medium for this pathogen (Casa et al., 2006, in Da Silva Siquiera et al., 2014).

Wise et al. (2017) mention that there are currently corn hybrids available on the market that are less susceptible to this disease, although there are none that are fully resistant to it.

### 1.3.3 Symptoms associated with different organs and phenological stages

The first symptoms on leaves manifest as small brown spots, surrounded by a chlorotic halo, which then expand adopting an irregular or elliptical shape (Bermudez Cardona et al., 2016). On these spots also develops the sign of the disease which are the pycnidia. The leaves end up wilted and dry (Romero & Wise, 2015).

Oval-shaped, elongated or irregular lesions, 1 to 10 cm long, which may eventually coalesce, with a light brown center, develop on the stem. Dark-colored pycnidia also develop in this area, and white mycelium of the fungus may also develop (EPPO, 2022). The base of the stem may eventually rot (Mário et al., 2017).

At the level of the ear, infection begins at the base of the ear, which may turn completely grayish brown and even rot. Pycnidia form on the grains and the white mycelium of the fungus develops between the grains (EPPO, 2022).

In cold areas from infected seeds preemergence seedling death may occur, while in warm areas weak seedlings may be produced. They may also develop brown lesions on the stem, while seedling roots die (EPPO, 2022), as may the rest of the seedling (Mário et al., 2017).

Disease severity is influenced by potassium deficiencies, drainage, and mechanical damage by insects, as well as by the cultivar used and planting density. Grain and ear rot are favored by the presence of rainfall during the reproductive stage (EPPO, 2022). The incidence of this disease is visualized as an early drying of plants, which occurs randomly in the lot, the plants dry from top to bottom and over time can be observed overturning of plants (De Rossi et al., 2016).

Flint corn is more resistant than dent corn, although no hybrid is immune. Seed treatment is effective in controlling the disease, however, once the fungus is established in the soil, crop rotation is necessary to eliminate it (EPPO, 2022).

### 1.3.4 Behavior and distribution in the batches

In spring, primary infection is favored by low humidity conditions in the environment at the beginning of the growing season, followed by periods of extensive rainfall, after R1 (stigma emergence) (EPPO,2022). From R1 onwards, *S. macrospora* spores can contact the spikelets and then infect the developing kernels, which are then infected.

end up rotting (Bermudez-Cardona et al., 2016; Da Silva Siquiera et al., 2014; EPPO; Wise et al., 2017). The conditions that favor this are high levels of rainfall, from R1 to harvest, with the first weeks from R1 being those in which the ears will be most susceptible.

The disease is visualized as an early drying of plants, which occurs randomly in the lot, the plants are drying from top to bottom and eventually tipping may occur (De Rossi et al., 2016).

### 1.3.5 Similarities with other pathogens

The symptoms of this disease, as well as the cycle of this pathogen is very similar to that of *Stenocarpella maydis*, only that the latter is found in colder areas than *S. macrospora.* By means of laboratory analysis it is possible to identify and differentiate both species (EPPO, 2022).

Root and stem rot can also be caused by *Fusarium graminearum*, *Fusarium verticillioides*, *Stenocarpella maydis*, *Colletotrichum graminicola* and *Macrophomina phaseolina*. On the other hand, ear rot can also be due to *Fusarium graminearum*, *Fusarium verticillioides*, *Stenocarpella maydis*, *Aspergillus spp*. and *Penicillium spp.* (De Rossi et al., 2016).

## 2. Bibliography


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## 3. Annex: Figures

**Figure 1:** *Stenocarpella macrospora* ear rot (CABI Plantwise).

**Figure 2:** Brown spots produced on basal internodes by *Stenocarpella macrospora* (CABI Plantwise).

**Figure 3:** Necrotic spots surrounded by a chlorotic halo on corn leaves, caused by *Stenocarpella macrospora* (Source: CABI Plantwise).

**Figure 4:** Pycnidia present on lesions produced by *Stenocarpella macrospora* on maize leaves (CABI Plantwise).

**Figure 5**: Different stages of *Stenocarpella macrospora* infection of leaves of maize leaves (Plantwise. Available at: https://www.plantwise.org/FullTextPDF/2011/20117800334.pdf.)