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A Research on Disease-Causing Microfungi on Golden Sesame Plant Growing in Manavgat District

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Abstract: This study was carried out to determine the parasitic microfungi seen in the 'Golden Sesame' (*Sesamum indicum* L.) production areas in Sorgun, Aksaz and Cevizler (Manavgat) locations of Manavgat (Antalya) city in the spring-summer season (May-August months) in 2019. Fungi, including *Alternaria*, *Cercospora*, *Macrophomina*, *Fusarium*, *Podospaera* species have been found. Fungal descriptions, illustrations and geographic distribution of pathogenic fungi are presented.

Key words: Pathogen fungi, gold sesame, Manavgat, Turkey

Manavgat İlçesinde Yetiştirilen Altın Susam Bitkilerinde Hastalığa Neden Olan Mikروفunguslar Üzerine Bir Araştırma

Öz: Bu çalışma, Manavgat (Antalya) şehrinin Sorgun, Aksaz ve Cevizler (Manavgat) bölgelerindeki 'Altın Susam' (*Sesamum indicum* L.) üretim alanlarında, 2019 yılında, ilkbahar-yaz mevsiminde (Mayıs-Ağustos ayları) parazit mikromantarların belirlenmesi amacıyla yapılmıştır. Yapılan çalışmalar sonucunda; susam tarlalarında *Alternaria*, *Cercospora*, *Fusarium*, *Macrophomina*, *Podospaera* cinslerine ait türler tespit edilmiştir. Makale de türlere ait tanımlamalara, resimlere ve coğrafik dağılımlara da yer verilmiştir.

Anahtar kelimeler: Patojenik mikromantar, Altın susam, Manavgat, Türkiye

Introduction

Sesame (*Sesamum indicum* L.) is a one-year shrub plant belonging to Pedaliaceae family. Sesame is known one of the most ancient and as an oilseed crops cultivated in tropical and subtropical regions of the world (Weiss et al 1971; Kun et al. 2014; Silme and Çağırğan, 2010). Sesame is grown in countries such as India, Myanmar, Uganda, Nigeria, Pakistan, Bangladesh, Ethiopia, Thailand, Turkey and Mexico (FAOSTAT, 2013). It is determined that sesame Muganlı 57 varieties, grown in Manavgat city (Antalya) are important in terms of grain size, color and oil content and preferred by the world countries. High yield of sesame seeds and oil yield in Manavgat and its vicinity showed that microclimate conditions of this region are suitable for sesame seeds and the region accelerated sesame cultivation. 'Golden

Sesame' called sesame of Manavgat, Turkey sesame meets 20 % of its production (MATSO, 2019) (Figure 1.a, b). As in other species of parasitic fungi, the damage to plants is very serious. In order to be able to combat this, the fungus species that are the source of infection should be identified first. Grown in high yield in Antalya-Manavgat district 'Golden Sesame' called *Sesamum indicum* L. plant was intensively randomly selected from Cevizler, Aksaz and Sorgun province and samples were taken from cultivated sesame fields (Figure 2). Plant parasitic fungi cause loss of quality, productivity and quantity in plants all over the world and sometimes even complete loss of crops. Plant parasitic fungi can cause a variety of diseases on plants. Plant parasitic fungi cause loss of quality, productivity and quantity in plants all over the world and sometimes even complete loss of crops.



Plant parasitic fungi can cause a variety of diseases on plants. If it shows signs of deterioration, decay, fragmentation and drying, and the disease is too much advanced, the plant cannot grow and flowers and fruit cannot develop.

Various diseases of sesame caused by different pathogens have been described in many parts of the world. These pathogens are on sesame are quite widespread and causes appreciable yield losses on sesame.

Charcoal root rot or stem rot caused by *Macrophomina phaseolina* (Tassi.) Goid. is one of the main disease of this crop in Egypt and the world (Vyas, 1981). This disease, which heavy economic losses in sesame in Pakistan (Syed et al. 2015). *Pseudocercospora sesami-indici* (U. Braun) occurs on sesame throughout the tropics although it appears to be less common and widespread than *Cercospora sesame*. *Pseudocercospora sesami* can cause severe defoliation

of crops (Singh, 1984; Waller and Sutton, 1979; Shivas et al. 1996)

Alternaria sesami yield loss is caused and is an important fungal disease of sesame in African and Asian countries as China, India (Naik et al. 2017). *Fusarium oxysporum* causes seedling blight and *Fusarium* wilt of sesame (Cho and Choi, 1987) by blocking the root. One of the main diseases of sesame in India is *Levelliula taurica*, which causes powdery mildew (Jadhav, 2016; Mulpuri et. al., 2016).

Kavak and Boydak (2006), Silme and Çağırğan (2010) have investigated *Fusarium* diseases and Sağır et al. (2009) have investigated *Macrophomina phaseolina* diseases on sesame in Turkey.

Turkey is one of the major world producer of sesame seeds. Fungal diseases infecting on sesame of special economic importance cause significant losses in yield in Turkey.



Figure 1.a Sesame (*Sesamum indicum* L.) flowers and fruits b. Fungal diseases on sesame fruits



Figure 2. Sesame field in Cevizler (Manavgat)

Material and methods

In this study, samples infected by parasitic microfungi were taken from Sorgun, Cevizler and Aksaz province (Manavgat, Antalya) in the spring-summer seasons of 2019 (May, June, July and August). In the field studies, 75 plant samples infected with microfungi were collected. The distribution, ecological and morphological features such as sori (size, shape, colour) were noted.

Stereo microscope (SM) (Nikon C-Leds) and light microscope (LM) (Nikon Eclipse E100) were used for the morphological identification of the disease-causing microfungi in the collected plant samples. Identification of parasitic fungus species, *Microfungi on Land Plants* (Ellis and Ellis, 1985), *Parasitische Pilze an Gefäßpflanzen in Europa* (Brandenburger, 1985), *Dematiaceous Hyphomycetes, More Dematiaceous Hyphomycetes* (Ellis, 2001a, 2001b) were used. The studied specimens are identified and deposited at the Akdeniz University, Manavgat Tourism Faculty Laboratory in Turkey.

Results and discussion

Macro and microscopic features of the pathogenic fungi are given below:

1. *Alternaria sesami* (E. Kawam.) Mohanty & Behera

On sesame (*Sesamum indicum* L.) attacking leaves, seedlings, stems of young plants. On leaves were circular concentric rings with brown to dark brown color around the infection. On leaves causing round or irregular, often zonate spots up to 3-6 diam. and frequently coalescing. Often leaves fall prematurely (Figure 3)

Distribution: Iraq, Afghanistan, China, Greece, India.

2. *Cercospora sesami* Zimm.

Colonies amphigenous. Conidiophores fasciculate, mid pale olivaceous brown. 30-124×2-4µm. Conidia hyaline, 6-13 septate. On sesame causing small, whitish or pale brown spot with dark borders (Figure 4).

Distributions: Kenya, India, Pakistan, Somali, Indonesia, Tanzania, Uganda.

Cercospora sesami, infects all above ground parts of the plant, resulting in complete defoliation which leads to severe economic losses. The disease, starts as small spots on the infected leaves.

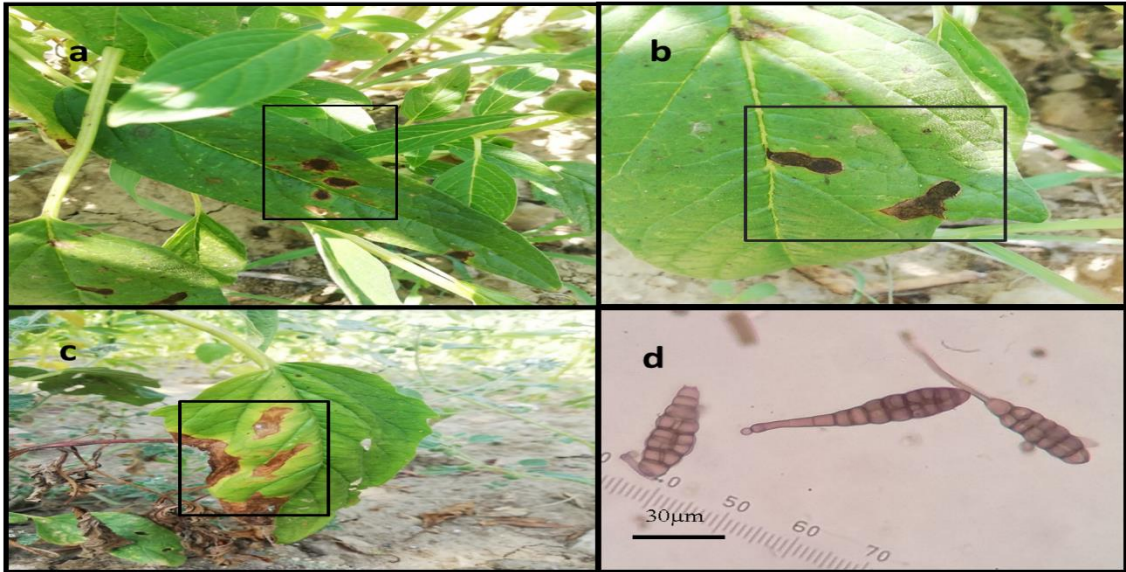


Figure 3. *Alternaria sesami* on sesame a, b, c. *A. sesami* on sesame leaves d. Conidiospores of *A. sesami*

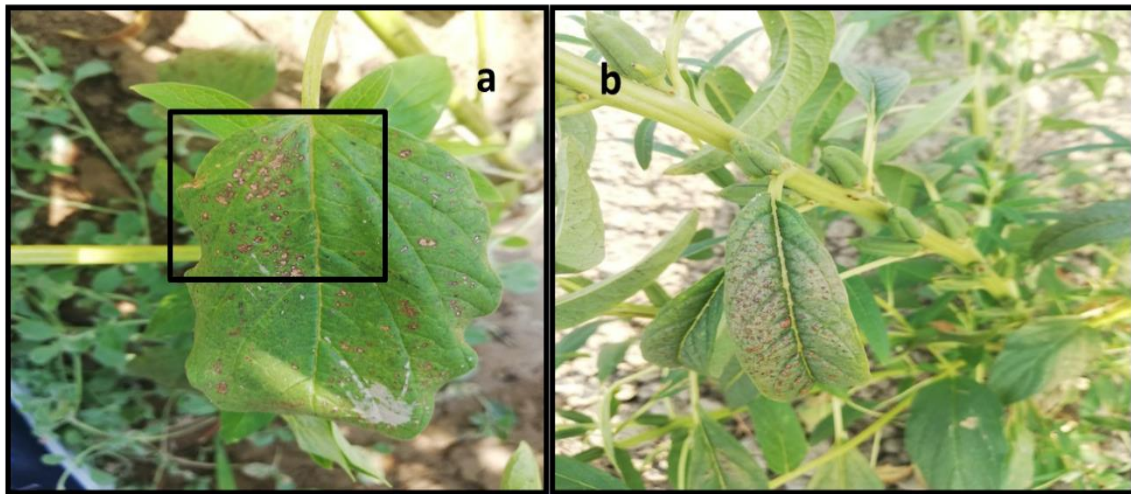


Figure 4. *Cercospora sesami* on sesame a., b. *C. sesami* on sesame leaves

3. *Macrophomina phaseolina* (Tassi) Goidanich

Colonies occurring in host plants tissue, black, smooth, 100–750 µm diam. Conidiomata pycnidial, dark brown to black, solitary or gregarious, up to 150 µm diam, wall multilayered, cells dark brown, thick-walled. Conidia ellipsoid to obovoid, 11–16 × 4–10 µm; immature conidia hyaline (Figure 5).

Root rot, caused by *Macrophomina phaseolina* (Tassi.) Goid., is one of the main disease of this crop in Turkey and the world (Rajput et al. 1998; El-barougy, 1990; El-shakhess, 1998; Dinakaran & Mohammed, 2001)



Figure 5. a., b. *Macrophomina phaseolina* on sesame

4. *Fusarium oxysporum* Schldl.

Conidiophores 13–6 μm tall, unbranched or sparingly branched, often subulate to subcylindrical,

smooth and thin walled. Conidia falcate, curved dorsiventrally with almost parallel, (1–)3(–5)-septate, hyaline, thin walled (Figure 6).

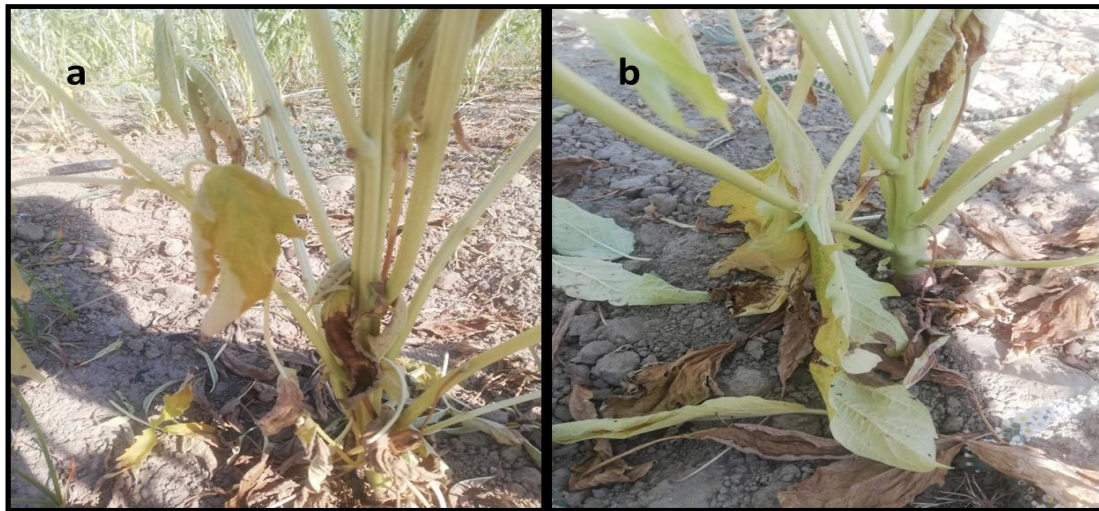


Figure 6.a, b. *Fusarium oxysporum* on sesame leaves c. Conidiospores of *F. Oxysporum*

5. *Podosphaera fusca* (Fr.) U. Braun & Shishkoff

Mycelium scattered, appears as pale yellow spots on both sides of the stem, petioles and leaves on the host or in groups. These spots enlarge as white powdery fungal growth comprising primarily of asexual spores (conidia) develops on upper and under leaf surfaces,

petioles, and stems of infected plants, shaded lower leaves, and leaf undersurfaces. Conidiophores were septate, conidia formed in short chains, hyaline, doliform shaped, 21 x 12 μm (Figure 7).

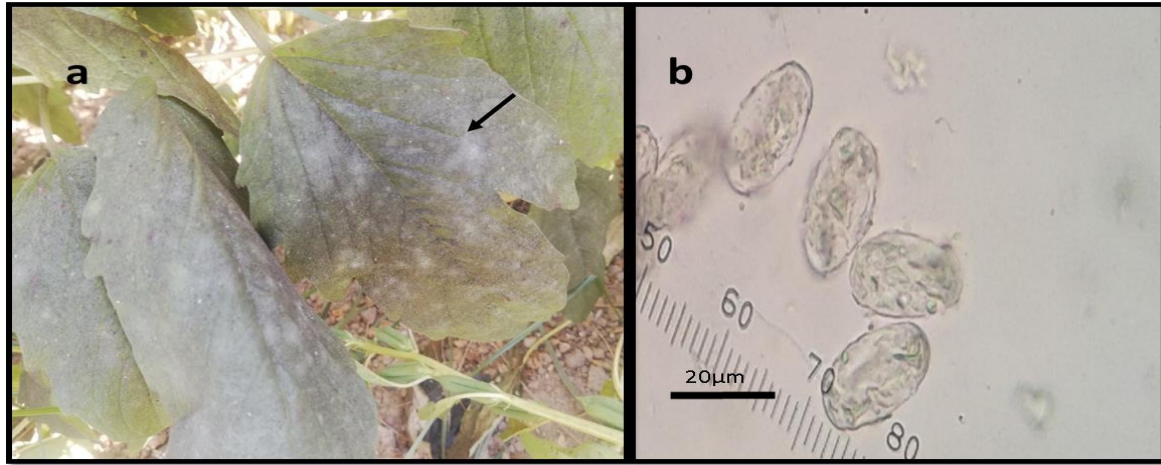


Figure 7. *Podospaera fusca* on sesame a. *P. fusca* on leaves b. Conidiospores of *P. fusca*

This study carried out in Manavgat city (Sorgun, Cevizler and Aksaz province) (Antalya) showed that parasitic fungi cause various diseases on Golden Sesame (*Sesamum indicum* L.). Five different parasitic fungal species were detected in 75 plant samples. Species of *Alternaria*, *Cercospora*, *Fusarium*, *Macrophomina* and *Podospaera* were presented.

As a result of the study, it was found that plant parasitic fungi, which cause disease to sesame plant, cause disease in cultivated lands in Manavgat district as in many parts of the world. In order to obtain high yields from the sesame plant, it is necessary to identify the plant parasitic fungi that may cause disease and to know the necessary biological control studies related to this.

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