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NEW OR UNUSUAL DISEASE REPORTS

First report of olive anthracnose caused by *Colletotrichum gloeosporioides* in Tunisia

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Summary. Ripe and overripe olive fruits (cv. Meski, Manzanilla and Picholine) showing circular spots 1 to 10 mm in diameter, slightly depressed and reddish-brown in color, were collected from local markets and orchards located in the regions of Takelsa, Zarzis and Rgueb in Tunisia. *Colletotrichum gloeosporioides* was isolated from symptomatic fruits and Koch's postulates were fulfilled. This is the first report of *Colletotrichum gloeosporioides* causing anthracnose of olives in Tunisia.

Key words: *Olea europea*, Meski, Manzanilla, Picholine.

Introduction

Anthracnose of olives (*Olea europaea* L.) is caused by *Colletotrichum gloeosporioides* (Penz.) Penz. & Sacc. (syn. *Gloeosporium olivarum* Alm.). The disease was first observed in Portugal (Gorter, 1956). Subsequently, it was reported in the Mediterranean countries such as Spain (Martin *et al*., 2002), Italy (Agosteo *et al*., 2002) and Serbia and Montenegro (Vučinić and Latinović, 1999). The disease has also been reported in other countries such as Australia, Brazil, China, India, Indonesia and Malaysia (Lo Prineno and Tenerini, 1960; Martelli, 1960; Gorter, 1962; Martín and García-Figueres, 1999).

The pathogen mainly affects olive fruits, but it can also affect lemon and orange fruits, and many wild and cultivated plants in the tropical regions. Furthermore, it attacks almond fruits and a wide range of crops including strawberries (Ritchie and Cannon, 2003).

In olive, *C. gloeosporioides* usually attacks ripe or overripe fruits, and only rarely the leaves, peduncles and shoots. On the fruits, the disease causes soft circular rotted spots, on which slimy orange-colored masses of spores are produced under high humidity. On the leaves, it may cause small spots (Ritchie and Cannon, 2003). The fungus affects olive oil quality by increasing the free acidity and the peroxide number. The peroxide number may even surpass the threshold of 20 $mEqO_2$ kg^{-1} of oil, which represents the legal limit of edibility (Iannotta *et al.,* 1999).

Colletotrichum gloeosporioides has a latent period and spores can survive saprophytically for long periods. Infections begin by the spores germinating from the acervuli on the fruits, leaves and young shoots (Martelli, 1960). Attacks commonly occur from over-wintering spores or mycelium under favorable climatic conditions (Roger, 1953; Zachos and Makris, 1963). Conidia produced in the

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pustules are spread by rain and wind within and between trees.

In 2005, 2006 and 2008 anthracnose was observed on ripe and overripe olives (cv. Meski, Manzanilla and Picholine) in orchards located in the regions of Takelsa, Zarzis and Rgueb. Infected olives were also collected from some local markets. The aim of the present study was to investigate the etiology of the anthracnose seen on these olives.

Materials and methods

Isolation and culture of the causal fungus

Infected olives were collected from orchards in Takelsa, Zarzis and Rgueb and from local markets. These olives showed a soft circular rot on their surface consisting of slightly depressed reddish-brown spots. Such spots expanded to up to 20 mm in diameter and coalesced to form the characteristic circular sunken lesions (Figure 1).

Small portions of infected olives were surface-sterilized in 10% sodium hypochlorite (NaOCl) for 5 min, rinsed in sterile water and placed on Petri dishes containing potato dextrose agar. Pure cultures were obtained by plating a small piece of the mycelium from the margin of a colony and incubating at 24°C for 10 days.

Pathogenicity test

In order to verify the pathogenicity of the pathogen isolated, ten olives (cv. Meski) were surface-sterilized as above and then dipped for 10 min in conidial suspensions (10^7 conidia mL^{-1}) obtained from five different isolates. The conidia were collected from 10–day-old cultures in PDA medium and suspended in sterile distilled water containing 0,001% of Tween 20. They were then filtered through glass wool, washed three times with distilled water, and re-suspended in water to give a final concentration of 1×10^7 conidia mL^{-1}. Inoculated olives were kept in a humid chamber at 25°C for ten days. Olives dipped in sterile distilled water were used as control. Three replications were used and the assay was repeated twice. Ten olives were examined in each replication.

Results and discussion

Several species belonging to the genus *Colletotrichum* cause serious diseases in a wide range of crops including legumes, vegetables, and fruit crops. The olive tree is an important crop in the Mediterranean basin, and anthracnose is becoming increasingly injurious here. The disease is very common in Portugal and may cause losses of up to 100%, particularly in the widely cultivated variety Galega, but the disease is also spreading to other Mediterranean countries such as Spain (Martin *et al*., 2002), Italy (Agosteo *et al*., 2002), Serbia and Montenegro (Vučinić and Latinović, 1999) and recently Tunisia. The disease causes major yield losses and poor oil quality.

The isolates on PDA showed a grey to olive-green mycelium with a great number of acervula (Figure 2). Spores were elliptical, one-celled and hyaline, 15–24×4–6 μm. The morphological characteristics and size of the conidia corresponded to the description key of *C. gloeosporioides* (Ritchie and Cannon, 2003). According to this key, the size of the conidia of *C. gloeosporioides* is 9–24 × 3–4.5 μm.

Figure 1. Olives harvested from orchards and showing symptoms of anthracnose.

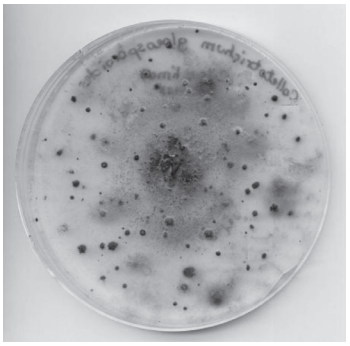

Figure 2. Macroscopic aspect of *Colletotrichum gloeosporioides* on PDA medium

Inoculated olives showed the typical symptoms of *C. gloeosporioides* ten days after inoculation. All the inoculated olives showed symptoms of the disease and some of them were completely rotted (Figure 3). Reisolation of the fungus from inoculated olives on PDA produced mycelia and conidia with the same characteristics as the fungus inoculated (Figure 3).

Besides *C. gloeosporioides*, *C. acutatum* also sporadically causes olive anthracnose. The co-occurrence of these two fungi was reported in Spain on a very limited scale (Martín and García-Figueres, 1999). However, Talhinhas *et al*. (2005) stated that these two species were not seen together on the same plant.

Control of the disease is based on chemical fungicides. A recent study of Pennisi *et al*. (2008) reported that bordeaux mixture and copper oxychloride were the most effective against *C. gloeosporioides*.

To our knowledge this is the first report of olive anthracnose in Tunisia. Further studies are needed to determine the distribution and to assess the economic impact of this disease in Tunisia.

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Figure 3. Typical symptoms of *Colletotrichum gloeosporioides* after inoculation on olives.

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