Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Fruit Rot of Sweet Pepper Caused by *Cladosporium cladosporioides* in Israel

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Sweet pepper (*Capsicum annuum* L.) is an important vegetable crop grown in Israel for local and export markets. Bell pepper 'Dinamo' and sweet bite pepper exhibiting fruit spotting were observed in postharvest storage of commercial farms in Giv'at Ko'ah (32°02'21" N; 34°56'41" E) and Arava (30°46'41" N; 35°14'28" E) in July 2021. Fruit with lesions were sporadic at each facility, however, a limited number of packaged boxes were discarded due to a high percentage of symptomatic fruit. The spots appeared as slightly sunken dark brown or black lesions, coated by a fine velvety layer of olive-gray conidia. A fungus was routinely isolated from the fruit onto potato dextrose agar (PDA) amended with 50 ppm chloramphenicol and was tentatively identified as a *Cladosporium* spp. based on colony morphology and conidial appearance. Isolates ($n = 6$) of the fungus were cultured on malt extract agar (MEA) and PDA for morphological observation. On MEA, the pathogen sporulated profusely and conidia measured $4.5 (3 \text{ to } 7) \times 3.5 (2 \text{ to } 4) \mu\text{m}$ and were smooth and globose or subglobose. Ramoconidia had zero or one septations and measured $13.4 (10 \text{ to } 18) \times 3.9 (3 \text{ to } 6) \mu\text{m}$. Conidiophores were solitary, straight or flexuous, usually unbranched, and measured 60 to 350 μm . Both macro- and micronematous conidiophores were present. Hyphae were flat and immersed, olivaceous-gray, septate, and rope-like. The fungus was slow growing, reaching 41.0 mm after 10 days of incubation at 20°C. To confirm species identity, the isolates were grown in potato dextrose broth and DNA was extracted from the mycelium using a MasterPure DNA Purification Kit (EpiCentre, Madison, WI, U.S.A.) following the manufacturer's instructions. The internal transcribed spacer (ITS) region was amplified using primers ITS 1 and ITS 4, and the elongation factor-1 and actin gene regions with EF1-728F/

986R and ACT-512F/783R, respectively (Carbone and Kohn 1999). The PCR products were sequenced and a BLASTn search showed 99 to 100% similarity to *Cladosporium cladosporioides* (GenBank accession nos. MW255614.1, MK416093.1, MK306457.1), a common fungal species found worldwide as a plant pathogen and saprophyte (Bensch et al. 2012). The ITS gene sequences for a representative isolate from each location were deposited in GenBank (accession nos. OK104139.1 and OL672241.1). To confirm pathogenicity, red bell pepper fruits ($n = 8$) were wounded with a sterile needle and a 12 μl drop of conidial suspension ($4 \times 10^5/\text{ml}$) of each isolate was pipetted onto the wound. Control fruit received sterile water. The fruit were incubated at 100% RH in sealed containers at 20 to 22°C. After 7 to 10 days of incubation small dark sunken spots developed, and by 14 days lesions formed with velvety conidial growth similar to the ones originally observed. The fungus was successfully isolated again from the lesions onto PDA and confirmed as *C. cladosporioides* based on colony and conidial morphology. No symptoms developed on fruit inoculated with sterile water. The pathogenicity test was repeated two times with similar results. *C. cladosporioides* is a cosmopolitan pathogen and has been cited causing disease on numerous crops worldwide (Bensch et al. 2012). This species was reported causing tomato leaf spot in Mexico (Robles-Yerena et al. 2019) and black mold of tomato fruit in Australia (Ma et al. 2020). *Cladosporium herbarum* was found causing fruit rot of bell pepper in the United States (Ramsey and Heiberg 1952). Sweet peppers are widely grown in Israel, and have high economic value as an export crop. Control measures to limit losses from *C. cladosporioides* postharvest may be necessary if conditions are favorable for disease during prolonged storage and refrigerated transport.

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