CSIRO PUBLISHING
www.publish.csiro.au/journals/apdn *Australasian Plant Disease Notes*, 2008, **3**, 162–164

The role of *Monosporascus cannonballus* in melon collapse in Iran

A. Sarpeleh

Plant Disease Research Department, Plant Protection Research Institute, Evin 19395-1454, Tehran, Iran.
Email: asarpeleh@yahoo.com

Abstract. Melon collapse is an economically important disease worldwide, induced by several soilborne plant pathogens including *Monosporascus cannonballus*. A disease with symptoms similar to melon collapse has been observed in hot and arid regions of Iran. However, no pathogen has been yet reported to be associated with this disease. In this study, *M. cannonballus* was isolated for the first time from melon plants grown in Iran. Pathogenicity testing of the isolates demonstrated that *M. cannonballus* is one of the causes of melon collapse in Iran.

Fig. 1. Symptom expression of melon collapse in shoots and roots due to *Monosporascus cannonballus*. General chlorosis of crown leaves (*a*), followed by general necrosis (*b*) and entire canopy collapse, 1–2 weeks before harvest, exposing the fruits to solar radiation (*c*). Roots of infected plants lacking secondary and tertiary feeder roots (*d*) and discrete necrotic lesions (*e* and *f*) caused by *M. cannonballus*.

 10.1071/DN08063 1833-928X/08/010162

Diseased cantaloupe and muskmelon (*Cucumis melo*) samples were collected in 2001–02 from fields located in hot and arid regions of Iran (Garmsar, Ivankey, Zahedan and Kashan). The symptoms were first evident as general chlorosis in crown leaves (Fig. 1*a*) that progressed into apical leaves; followed by progressive necrosis (Fig. 1*b*) and collapse of the entire canopy 10–14 days before harvest (Fig. 1*c*). Brown spots were visible on roots, particularly at root junctions, and there was deterioration of the secondary and tertiary feeder roots (Fig. 1*d*, *e*). Fruits exposed to solar radiation (Fig. 1*f*) were smaller, sun scalded and had lower sugar content than fruit from healthy plants.

The roots of cantaloupe and muskmelon plants with these symptoms were used to isolate the suspected causal organism. The roots were washed under tap water then in 1 L of 1% sodium phosphate on a shaker for 15−20 min to remove soil (Aegerter *et al*. 2000). Pieces of root (3–5 mm) with brown spots or lesions were surface sterilised using 0.5% sodium hypochlorite then placed in Petri plates containing potato dextrose agar (PDA). After the plates were incubated at 25°C for up to 4 days, hyphal tips were transferred to fresh Petri plates containing either PDA or cornmeal agar (CMA) and incubated at 25°C for up to 30 days.

Fusarium solani [identification based on morphological characteristics on carnation leaf agar (Nelson *et al*. 1983)] and an ascomycete described as follows were isolated from infected roots. This ascomycete formed perithecia on CMA after 20–25 days of incubation at 25°C. The perithecia were globose, smooth walled and 500–520 × 340–350 µm diam. (Fig. 2*a*). Asci were clavate, constricted at the base, unitunicate, thick walled, 93 × 46 µm diam. and contained only one ascospore (Fig. 2*b*). Ascospores were spherical, smooth, unicellular, thick-walled, 35−50 µm diam. and hyaline at first, turning dark brown at maturity (Fig. 2*b*). No conidial stage was observed on PDA or CMA after 1 month of incubation at 25°C and the fungus grew only as septate, hyaline hyphae 2–8 µm in diam. The fungus was identified as *Monosporascus cannonballus* Pollack and Uecker (1974), which is being described for the first time from cantaloupe roots in Iran.

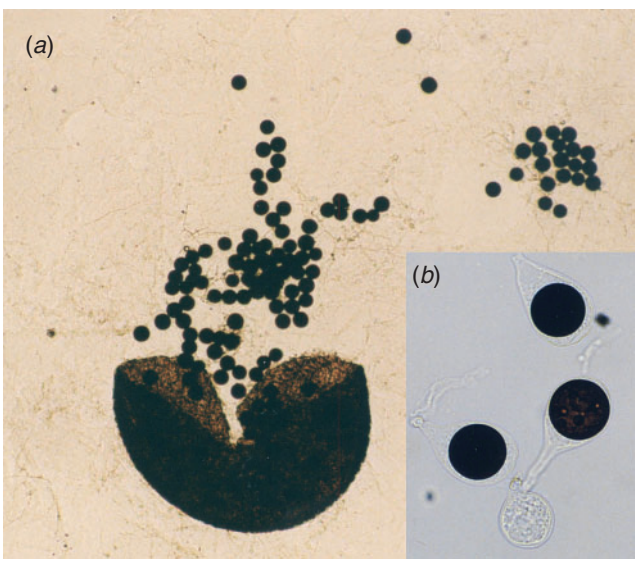

Fig. 2. Perithecium, asci and ascospores of *Monosporascus cannonballus*. Perithecium of *M. cannonballus* (*a*) containing asci and ascospores (*b*) formed on cornmeal agar, after 25–30 days incubation at 25°C.

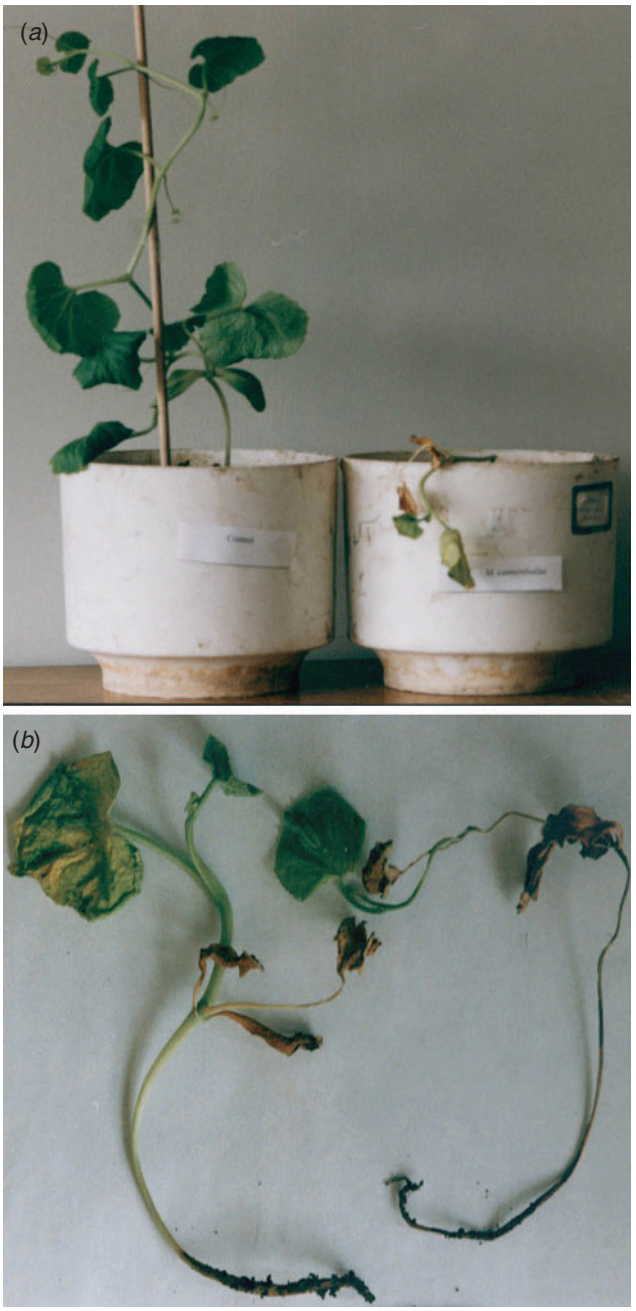

Fig. 3. Pathogenicity of *Monosporascus cannonballus* on muskmelon cv. Zard-e-Garmsar inoculated with *M. cannonballus* kept at 30 ± 2°C for up to 50 days (right) and healthy control plants (left) (*a*). The feeder roots rotted following inoculation with *M. cannonballus* (*b*).

For pathogenicity tests, *F. solani* and *M. cannonballus* were grown on a double sterilised mixture of washed sea sand and ground oat hulls (1 : 10) in 1 L flasks (Aegerter *et al*. 2000). These cultures were kept at room temperature under 12 h of fluorescent light/day for 5 weeks, then used to inoculate a local variety of muskmelon named Zard-e-Garmsar using the method described by Aegerter *et al*. (2000) and Bruton *et al*. (1995). The inoculated plants were kept in a growth chamber at 30 ± 2°C and monitored daily for up to 50 days.

Isolates of *F. solani* did not induce any symptoms on muskmelon plants in this study (data not shown), while *M. cannonballus* isolates incited general chlorosis of crown leaves 25–30 days after inoculation, with general necrosis evident 40–50 days after inoculation and reduced plant growth compared with the controls (Fig. 3*a*). The roots of inoculated plants grew very poorly and developed dry root rot (Fig. 3*b*). *M. cannonballus* was reisolated from the roots of inoculated plants. This study demonstrated that *M. cannonballus* is one of the causes of melon collapse in Iran.

Acknowledgements

We thank Professor Jafar Ershad for his help in the identification of fungal isolates and Dr Asghar Heydari for review of the manuscript.

References

Aegerter BJ, Gordon TR, Davis RM (2000) Occurrence and pathogenicity of fungi associated with melon root rot and vine decline in California. *Plant Disease* **84**, 224–230. doi: 10.1094/PDIS.2000.84.3.224

Bruton BD, Gordon TR, Davis RM (1995) Optimum CFU concentrations for testing pathogenicity of California cucurbit isolates of *Monosporascus cannonballus* and an *Acremonium* sp. (Abstr.) *Phytopathology* **85**, 1119.

Nelson PE, Toussoun TA, Marassas WFO (1983) '*Fusarium* species: an illustrated manual for identification.' (Pennsylvania State University Press: University Park, PA)

Pollack FG, Uecker FA (1974) *Monosporascus cannonballus*, an unusual Ascomycete in cantaloupe roots. *Mycologia* **66**, 346–349. doi: 10.2307/3758370

Manuscript received 17 September 2008, accepted 10 November 2008