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A New Stem Spot Disease of Pitahaya [*Hylocereus undatus* (Haw.) Britton and Rose] caused by *Fusicoccum*-like anamorph of *Botryosphaeria dothidea* (Moug.:Fr.) Ces. and De Not. in Mexico

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Abstract. Stem spot disease of the epiphytic plant pitahaya is common in wild plants and in commercial plantings in Mexico. This disease was studied and proved to be caused by a probable *Fusicoccum*-like anamorph of *Botryosphaeria dothidea*. The pathogen produced brown spots of various sizes on stems. Sometimes, lesions on the stems expanded and affected the entire stem.

Additional keywords: Fungus, artificial inoculation.

Resumen. La enfermedad mancha del tallo de la planta epifita pitahaya es común en plantaciones silvestres y comerciales de México. Esta enfermedad se estudió y se comprobó que probablemente es causada por un tipo de *Fusicoccum* anamorfo de *Botryosphaeria dothidea*. El patógeno indujo manchas de color marrón de varias dimensiones en los tallos de este hospedante. Algunas veces, las lesiones se expandieron y afectaron la totalidad del tallo.

Palabras clave adicionales: Hongo, inoculación artificial.

Pitahaya (*Hylocereus undatus* (Haw.) Britton and Rose (Cactaceae), also called pitaya and night-blooming cereus, is an endemic epiphytic plant in Mexico (Rodríguez, 2000). It can be found in the wild, growing in tropical and subtropical climates. According to farmers, pitahaya is considered a herb with healing properties. Patients with various illnesses, such as stomach and liver problems, use pitahaya regularly (Reyes, 1995; Rodríguez, 2000). For instance, juice or pulp prepared from pitahaya fruit has gradually become popular in Mexico. Recently, small scale plantings of pitahaya have been established, and the fruit from this plant has been exported from Mexico to foreign markets (Rodríguez, 2000). In 2001 and 2002, a number of pitahaya plants in Mecapalapa, Puebla State were found to have distinctive spots on stems. The suspected disease appeared to be present in most of the commercial plantings in various locations in Puebla State (e.g., Mecapalapa, Dolores Hidalgo, Xochitlan, and Tehuacan). The goal of this study was to complete Koch's postulates to stablish the etiology of these stem spots or lesions of pitahaya.

To isolate the pathogen, small pieces (ca. 1-5 mm in diameter) from diseased pitahaya stems with brown lesions were surface sterilized with 1.0% sodium hypochlorite for 2 min. After rinsing with sterile distilled water, tissues were blotted on sterilized paper towels, plated on fresh potato-dextrose-agar (PDA) (200 g potatoes, 20 g dextrose, 15 g agar in 1000 mL of distilled water), and incubated at 22-25°C. Fungi growing from the plated tissues were individually transferred again onto PDA, and incubated at 22-25°C under continuous fluorescent light. Three 15-20 cm tall pitahaya plants grown in a greenhouse in 25 cm diameter pots were used to to test the pathogenicity of isolates. They were inoculated by removing a single 6 mm diameter disc of cuticle and epidermis from the stems with a sterile cork-borer. The removed disc was replaced with a disc of PDA with the fungus from a 4 day-old culture. Three check plants were inoculated with sterile PDA discs. Wounds were sealed with masking tape, and each plant was covered with a polyethylene bag for 72 h to create high humidity. The experiment was repeated twice with different sets of pitahaya plants.

When naturally infected pitahaya plants were studied, the first noticeable symptoms in fields were brown lesions on stems. Most of the lesions on affected stems eventually became black

(Fig. 1A). Sometimes, pycnidia could be found in the spotted areas. Symptoms were brown spots of various sizes on pitahaya stems, and also on younger stems of plants at a later stage of disease development during the season. A fast growing, gray fungus was consistently isolated from diseased stems (Fig. 1B). The fungus produced pycnidia, 180 x 150 µm on PDA in 8-9 days. Pycnidiospores were unicellular, hyaline and ellipsoidal to fusoid with distinctly truncate bases, measuring 12.15-19.44 x 4.86-8.51 µm (av. 16.49 x 5.90 µm) (Fig. 1C). The fungus was identified as a *Fusicoccum*-like anamorph of *Botryosphaeria dothidea* (Moug.:Fr.) Ces. and De Not. A culture of this *Fusicoccum*-like anamorph was deposited in the plant pathogen collection of Colegio de Postgraduados, Montecillo, State of Mexico. The teleomorph was never observed in culture, and we shall hereafter refer to this pathogen as *Fusicoccum*. Three days after inoculation of healthy pitahaya stems with this microorganism, disease symptoms similar to those seen on naturally infected plants were observed. All stems inoculated were infected and turned brown. *Fusicoccum* similar to that used for the inoculation of pitahaya stems was recovered from all the artificially inoculated stems. All the check stems remained healthy throughout the experiment. The fungus grew only on the wounded parts of the stems. We believe that these data fulfill Koch's postulates with respect to pathogenicity of this *Fusicoccum* isolate on *Hylocereus undatus*, and that this fungus is the cause of pitahaya stem spot disease. To the best of our knowledge, this is the first report of stem spot of pitahaya caused by a probable *Fusicoccum*-like anamorph of *B. dothidea*. In Mexico, *Fusicoccum* has not been previously isolated from stems and shoots of any species of *Hylocereus*. *B. dothidea* has been previously reported to cause panicle and shoot blight and canker diseases of pistachio, peach, apple (Brown and Britton, 1986; Michailides, 1991),

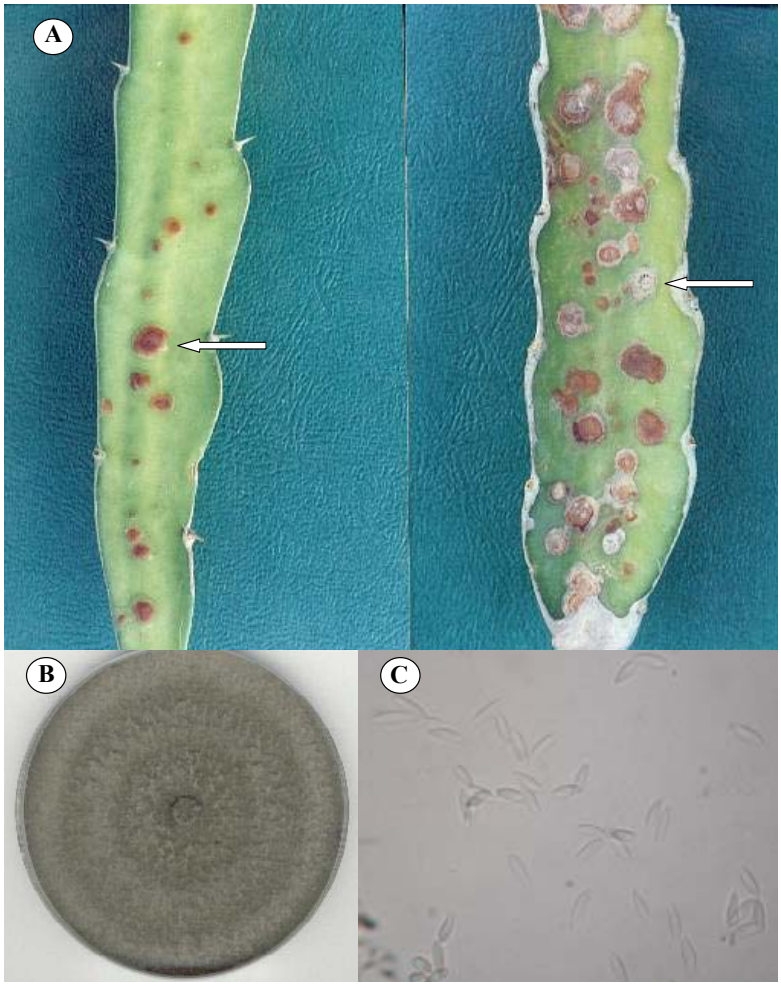

Fig. 1. Stem lesions of pitahaya, caused by *Fusicoccum*-like anamorph of *Botryosphaeria dothidea*. (A) Stems showing various stages of development; pycnidia of the pathogen can be seen (white arrows) in some of these lesions. (B) Mycelial growth of *Fusicoccum* on potato-dextrose-agar, after 4 days. (C) Pycnidiospores.

forest trees, chaparral bushes (Brooks and Ferrin, 1994), and many other plant species (Smith, 1934).This fungus may be found to be one of the most important pathogens of *H. undatus* in Mexico. Strategies to avoid losses, including screening species, clones, and hybrids for tolerance to this disease are in progress.

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