



Etiological agents of crown rot of organic bananas in Dominican Republic



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ABSTRACT

Crown rot is a postharvest disease with a great negative impact on banana fruit quality. The infections occur at harvest, but the symptoms appear after overseas transportation. Different fungal pathogens are involved in crown rot, varying according to farming area. In this study we focused on etiology of organic banana crown rot in the Dominican Republic, which is one of the leading exporters of organic bananas. Bananas from five organic farms and their corresponding packing stations located in the Valverde province were studied. Over a period of three years, 558 banana hands were collected and a total of 5000 fungal colonies were obtained from the crown tissues and 518 representative colonies were purified, characterized and identified using morphological and molecular methods. Fungi were found in all samples from field and from packing house and were distributed in 11 genera. The fungal community was dominated by *Fusarium*, the most frequent genus (55%) found in more than 80% of all samples. The genus was represented by nine species; *Fusarium incarnatum* 53%, the most frequent, followed by *Fusarium verticillioides* 12%, *Fusarium sacchari* 12%, *Fusarium proliferatum* 7%, and *Fusarium solani* 6%. The five least frequent species were *Colletotrichum musae*, 7% overall frequency and found in 13% of all samples; *Lasiodiplodia theobromae* and *Lasiodiplodia pseudotheobromae*, 4% and 1% overall frequency, respectively, both species found in 7% of all samples; *Nigrospora* sp. 11% overall frequency, *Alternaria* spp. 6% overall frequency, followed by *Phoma* spp., *Pestalotiopsis* sp., *Curvularia* spp., *Microdochium* sp. and some other species, known to be saprophytes, with frequency lower than 2%. The etiological agents of crown rot disease can be ranked based on their presence and pathogenicity as follows: *Fusarium incarnatum*, *Colletotrichum musae*, *Fusarium verticillioides*, *Fusarium sacchari*, and *Lasiodiplodia theobromae*.

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1. Introduction

Banana is one of the most important world tropical crops cultivated in more than 100 countries (Arias et al., 2003), with a total production in 2012 of 133.3 million tonnes (FAOSTAT, 2015). Dominican Republic is the biggest exporter of organic banana to Europe (FAOSTAT, 2015).

Bananas are affected by several diseases, and crown rot is considered one of the most important postharvest diseases, causing a great negative impact on fruit quality. Fungi are the causal agents of crown rot, and they belong to different genera and species, whose presence and frequency varied according to farming area (Adjei, 2010; Alvindia et al., 2002, 2000; Alvindia

and Natsuaki, 2007; Anthony et al., 2004; Greene and Goos, 1963; Griffee, 1976; Griffee and Burden, 1976; Knight, 1982; Krauss and Johanson, 2000; Lassois et al., 2010; Reyes et al., 1998; Umana-Rojas and Garcia, 2011a; Wallbridge, 1981). Susceptibility of banana fruits to crown rot is influenced by seasonal variation determined by many pre-harvest factors (Ewane et al., 2013). Infections start at harvest and during packing (deBellaire and Mourichon, 1997) and infected flowers are the main inoculum source for *Fusarium* spp. and for *Colletotrichum musae*, where *C. musae* can cause both crown rot and anthracnose (Kamel et al., 2016), and some of these pathogenic fungi were also found on decaying leaves (Meredith, 1962). Additionally, fungal inoculum on banana stalks is knife-transferred onto the cut crown surface at dehanding (Finlay et al., 1992) or when clusters are cleaned in contaminated water (Shillingford, 1977). Crown rot symptoms appear after overseas transportation as blackening and mold of the crown area and this renders fruit unmarketable. To reduce crown rot severity, fungicides are widely used with the exception of

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