***Athelia rolfsii* (= *Sclerotium rolfsii*) infects banana in the Philippines**

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Abstract

We surveyed eight banana farms planted with cultivar “Lakatan” in Central Visayas, Philippines, for fungal diseases in 2014. A rotting disease on the corm and leaf sheaths, splitting of the pseudostem and yellowing of the leaves were observed only in Toledo City, Cebu province. These symptoms were associated with sclerotial bodies and mycelial growth. The causal organism was identified by morphology and ITS sequence as *Athelia rolfsii* (= *Sclerotium rolfsii*) which is the first report of this fungal pathogen on banana from the Philippines.

Keywords Banana · Control of spread · Fungal disease · Identification

Banana (*Musa* sp.) is the leading fresh fruit in the Philippines and eighth most important food crop in the world, fourth in developed countries and fourth most important global food crop grown in more than 120 countries (FAO Report 2003; Anon 2016) and staple food for more than 400 million people (Swennen et al. 1995).

In 2014, a survey for corm rot disease of *Musa acuminata* cultivar “Lakatan” was conducted at eight plantations spread over Bohol, Siquijor, Negros Oriental and Cebu provinces of the Philippines. A characteristic corm rot disease associated with a *Sclerotium*-like fungus was detected in one site, namely Toledo City, Cebu province. Based on the characteristic

disease symptomatology, morphology of the fungus and its ITS sequence, it was identified as *Athelia rolfsii* (Anamorph: *Sclerotium rolfsii*) (Tu and Kimbrough 1978), which is a known pathogen of banana and numerous other hosts. The external symptoms of infected banana cultivar “Lakatan” include yellowing of older leaves from the base to apex and pseudostem rot with mycelial growth at the back of sheath. The rotten part has a yellowish-reddish brown colour with sclerotial bodies (Fig. 1). Splitting of the basal portion of the pseudostem sheath was also observed. The average sclerotial body was 1.25 cm in diameter ($n=100$) using a digital calliper. A representative culture was deposited in the culture collection of the Westerdijk Fungal Biodiversity Institute (CBS), the Netherlands, under accession number CBS 145328. To confirm the identity of the causal organism, the fungus was identified by ITS sequencing using standard primers and amplification conditions (White et al. 1990; sequence deposited in GenBank under accession number MK411221). The nucleotide sequence was identical over 683 nucleotides (100%, no gaps) to that of *A. rolfsii* isolate BOScr-1 (GenBank KJ546416.1 from butterfly orchid in China, unpublished) and differed with one nucleotide (682/683 (99%), none to a single gap) from numerous other sequences of the same species, e.g. GenBank GU080230.1 (from *Capsicum annuum* in Spain, Remesal et al. 2010). Pathogenicity tests of *A. rolfsii* were successfully

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Fig. 1 A. External symptom: yellowing of leaves; B. Mycelia of *A. rolfsii* on leaf sheath; and C. Sclerotial bodies (mature and young) of *A. rolfsii* on leaf sheath

conducted under uncontrolled conditions in a glasshouse using both potted 3-month-old tissue-cultured banana cultivar “Lakatan” plants and potted approximately 3-month-old corm bit-cultured banana cultivar “Lakatan” plants with four pots per replication. Sclerotial bodies incorporated in the soil and covered with dried banana leaf was found effective for *A. rolfsii* inoculation. At two weeks post inoculation, *A. rolfsii* was observed to have affected the leaf sheaths of inoculated plants, and to have produced sclerotial bodies (Fig. 2). The pathogenicity test was repeated twice. Symptoms observed on inoculated banana plants were similar to those observed on naturally infected plants. The pathogen was re-isolated in subsequent experiments, thus proving Koch’s postulates. *Athelia rolfsii* was reported in the Philippines as early as 1918 in rice (Reinking 1918), tomato, peanut (Fajardo and Mendoza (1935), cotton (Celino 1936),

Impatiens sultanii (Dizon and Pimentel 1993), pepper, mungbean and soybean (de la Cueva 1994), but not yet on banana. This is the first record of *A. rolfsii* on banana from the Philippines.

As a banana exporting country, Filipino farmers need to be aware of this newly reported disease that can be easily disseminated by infected banana plantlets due to the soil-borne nature of *A. rolfsii*. With reports of the devastation of the disease in onset in an experimental station in Ethiopia (Jones 2019) and in different banana growing states in India (Thangavelu and Mustaffa 2010), it could also have serious implications on the Philippine banana export industry. So far, no spread of the disease to adjacent areas has been observed, but the incidence has been reported both during wet and dry season. To further help contain the disease, a resistant banana cultivar “Cardaba” has been planted around the *Sclerotium* infested area.

Fig. 2 Pathogenicity test. *A. banana* cultivar “Lakatan” inoculated with *A. rolfsii* and B. Healthy banana cv. “Lakatan”

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