



First report of *Lasiodiplodia theobromae* causing canker on tapped *Boswellia papyrifera* trees in Ethiopia

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Boswellia papyrifera (Burseraceae) is found mainly in the Amhara, Tigray and Benshangul Gumze Regions of Ethiopia (Vollesen, 1989). This economically important tree species is widely used for frankincense (incense) production. Incense is extracted by frequent, intensive and repeated wounding made at different directions and positions on the bole of the tree. Depending on the size of the tree, there could be between 6 and 16 tapping spots that are refreshed and widened 8-12 times each year at an interval of 15 to 20 days (Gebrehiwot, 2003). Tapping for incense has a negative impact on the survival rate, growth and reproduction of the tree (Rijkers *et al.*, 2006) and wounding predisposes trees to microbial infection. Disease symptoms and death of *Boswellia* trees have been commonly observed in all areas where tapping has been practiced. Specific symptoms include canker formation, exudation of gum, wilting, dieback, vascular browning and death of the tree. This study was carried out to determine the cause of the observed disease on tapped *Boswellia* trees.

Samples were collected from Humera and Metema Districts, North Ethiopia. Isolation was made from ten tapped trees that developed scars and galls on the stem (Figs. 1, 2). No clear disease symptoms were observed in untapped trees. Pieces of wood pieces (5 mm²) were taken from each sampled tree, surface sterilised with 70% alcohol and inoculated on to malt extract agar (MEA) amended with streptomycin. Such pieces of wood were then incubated in a moist chamber at 25°C with 12 h light/dark cycle to induce fruiting structures. The pycnidia produced on the wood had a conical shape and were covered by dark grey mycelium. Spores collected from crushed pycnidia were transferred on to MEA. Pieces of mycelia from emerging fungal colonies were transferred to water agar medium containing sterilised pine needles and incubated at 25°C to produce spores for further morphological characterisation.

Colonies obtained from the different isolation procedures produced white and dense aerial mycelium, later turning black at the top and grey to black on the reverse side of the Petri dish. The brown coloured conidia were single septate, sub-ovoid to ellipsoid and longitudinally striated (Fig. 3) with dimensions of 19-30 x 12.5-15 µm. These morphological characteristics were identical with the description of *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl (syn. *Botryodiplodia theobromae*), the anamorph of *Botryosphaeria rhodina* Berk & Curt. Arx (Punithalingam, 1976).

A pathogenicity test was conducted *in situ* on the branches of ten randomly selected *Boswellia* trees. Two and three isolates of *L. theobromae* on MEA from Metema and Humera Districts respectively and pure MEA (control) were used. A 5 mm bark borer was used to make inoculation holes on the

bark of *B. papyrifera* trees. Inoculated branches were covered with Parafilm to hold inoculum in place as well as to avoid desiccation and contamination of the inoculum. After three months, the size of the lesions developed on branches inoculated with *L. theobromae* measured between 14.3 and 15.7 cm (Fig. 4). No lesion developed on trees treated with the control. This test confirmed that *L. theobromae* is pathogenic to *B. papyrifera* trees in Ethiopia. *L. theobromae* has previously been reported to cause dieback and death of mango and cacao trees in Pakistan and Cameroon respectively (Khanzada *et al.*, 2004; Mbenoun *et al.*, 2008). This is the first report of *L. theobromae* infecting *Boswellia papyrifera* in Ethiopia, which represents a new constraint to the sustainable management of *Boswellia papyrifera* and incense production.

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Figure 1



Figure 2

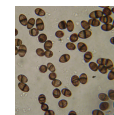


Figure 3



Figure 4

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