



First report of tiller rot of small cardamom (*Elettaria cardamomum* (L.) Maton) caused by *Marasmiellus* sp. in India

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In November 2019, cardamom (*Elettaria cardamomum* (L.) Maton) plants (var. Njallani Green Gold) exhibited water-soaked lesions on tillers, enlarging later into rotten areas with dark brown margin, leading to shrivelling and ultimately drying of the plants in fields of Idukki (09°50'60" N, 76°58'12" E) Kerala, India. The disease incidence ranged from 25 to 30% in the surveyed area. White powdery growth of the fungus was visible within the affected tiller sheaths. The fungus was isolated following standard protocols. Fluffy white (later cream coloured) mycelia were observed within three days on potato dextrose agar medium. Branched, hyaline hyphae (5–9 µm width) had the presence of clamp connections and no sporulation. The ITS region of rDNA was amplified using the universal primers ITS4/ITS5 (Sharafudheen and Manimohan 2019). Comparison of the sequence of amplicon revealed 99.57% sequence similarity with two isolates of *Marasmiellus* sp. with accession Nos. MEL 2,382,677 (KP013040.1) and MH016862. Based on morphological and molecular analyses, the fungus was identified as *Marasmiellus* sp. (Thiruchelvan et al. 2012). The ITS sequence of the isolate was deposited in NCBI database (MN 962,926). Phylogenetic analysis with sequences of ITS confirmed the fungus as *Marasmiellus* sp. One-year-old cardamom tillers (var. Njallani Green Gold) were inoculated with 5 mm culture discs of five-day-old fungal colonies at the outer sheath portion. The symptoms were noticed on the

15th day of inoculation. No symptoms were observed on uninoculated plants. The fungus was consistently re-isolated, which showed the same morphological and cultural characters of *Marasmiellus* sp. (Perez-De-Gregorio et al. 2011), thus proving Koch's postulates. To the best of our knowledge, this is the first report of tiller rot in cardamom across Kerala and elsewhere in India.

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Data availability This manuscript including the data that are supporting the aim and the conclusion of this research is new and is not being considered elsewhere. No data have been fabricated or manipulated for being published to this journal.

Declarations

Consent All the authors have sufficiently contributed to the work, have agreed to this submission and are responsible for its contents.

Human and animal studies This article does not contain any studies involving human participants or animals performed by any one of the authors.

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