



First report of *Macrophomina phaseolina* causing charcoal rot on lemon balm (*Melissa officinalis*) in Turkey

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Lemon balm (*Melissa officinalis* L.) is native to the Eastern Mediterranean region and Western Asia and is a well-known medicinal plant of Lamiaceae due to its valuable aqueous and alcoholic extracts (De Sousa et al. 2004). In the summer of 2021, wilting and root rot were observed on about 20% of two-year-old *M. officinalis* cv. Melis plants in a field of Koruklu village, Akçatepe district of Şanlıurfa, Turkey. Roots of symptomatic plants were collected and dissected into small pieces (5 mm), surface-sterilized in 1% sodium hypochlorite, rinsed in sterile water, and placed on potato dextrose agar (PDA). Fast-growing and fluffy dark grey fungal colonies consistently emerged from the segments after incubation at 26 °C in the dark for 5 days and had abundant microsclerotia, which were dark, smooth, oblong-shaped, and measured 123 µm × 82 µm ($n = 50$). Six isolates were purified and re-cultured on PDA. Sequence analysis of the internal transcribed spacers (ITS) of rRNA for the representative isolate Mp_Mo01 was obtained (OM397089) and, according to BLASTn analysis, the identity was ≥ 99.6 with different *M. phaseolina* strains. (e.g., KF531825 and KF766195). The pathogenicity was conducted by inserting a Mp_Mo01 colonized toothpick into the hypocotyl of *M. officinalis* cv. Melis seedlings, six-month-old with six

replicates. Three control plants were inoculated using the same procedure with sterile toothpicks. All plants were incubated at 26 °C with a 16-h photoperiod. After three weeks, root rot and wilting symptoms were observed only on inoculated plants, and the pathogen was re-isolated, fulfilling Koch's postulates. Although *M. phaseolina* has been reported to be associated with charcoal rot on common sage in Turkey (Koşar et al. 2021), to our knowledge, this is the first record on lemon balm in Turkey as well as worldwide (Farr and Rossman 2022).

Declarations

Informed consent This manuscript is new and not being considered elsewhere. All authors have approved the submission of this manuscript.

Research involving human participants and/or animals The authors declare that no human participants and animals were involved in this study.

Conflict of interest The authors declare that they have no conflict of interest.

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