



## First report of downy mildew caused by *Peronospora chlorae* on lisianthus in Turkey

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Lisianthus (*Eustoma grandiflorum*), also known as Texas bluebell, belongs to the family Gentianaceae. Lisianthus is a cut flower crop and is grown as an annual in İzmir, Turkey where greenhouse production exceeded 4 million plants produced from an area of 5.6 hectares in 2016 (TÜİK, 2017). In June 2017, plants showing severe downy mildew symptoms were observed in greenhouses in Menderes province. Under wet conditions, infected leaves turned yellow or pale green, with a greyish to brownish fungal-like downy growth developing on both the abaxial and adaxial leaf surface (Fig. 1). Leaf defoliation occurred at high disease severity and the remaining leaves withered.

Infected leaves were collected for microscopic examination and morphological identification. A layer of sporangiophores was observed on symptomatic leaves, characteristic of a downy mildew. Sporangiophores were hyaline with long straight trunks and ended with two slightly curved branchlets. The sporangiophores were 200–480 × 4–11 µm. Sporangia were ovoid and hyaline, and measured 14–20 × 14–18 µm (Fig. 2). The pathogen was identified as *Peronospora chlorae* based on morphological characteristics (Hall, 1994). DNA analysis was performed to confirm the identity of the pathogen. The internal transcribed spacer (ITS) region of rDNA was amplified and sequenced with primers ITS1 and ITS4 (White *et al.*, 1990) and the sequence was submitted to GenBank (Accession No. MG711454). A BLASTn analysis showed 100% identity to *P. chlorae* (KT271839), confirming the identity of the pathogen.

For pathogenicity testing, infected leaves were collected and sporangia were washed from the diseased leaves with sterile water. Pathogenicity tests were performed by spraying lisianthus seedlings with the conidial

suspension. Plants were then covered with plastic bags and incubated at 22–24°C with 90% relative humidity. Seven days post inoculation, sporangiophores were observed on infected lisianthus plants while no symptoms were observed on control plants.

*Peronospora chlorae* has been previously reported from Denmark, France, Hungary, Italy, The Netherlands, Norway, Poland, Portugal, Spain, Switzerland, Ukraine, United Kingdom, the former Yugoslavia, Canada, Mexico, and China (Yang *et al.*, 2016). To our knowledge, this is the first report of *P. chlorae* causing downy mildew on lisianthus in Turkey.

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Figure 1



Figure 2

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