First report of *Ophiostoma novo-ulmi* ssp. *americana* causing Dutch elm disease on *Ulmus procera* in Lebanon

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In July 2018, high mortality incidence (80%) was observed on English elm (*Ulmus procera* Salisb.) in four sites in Ammiq, Lebanon. Ten samples of bark and 40 specimens of adult bark beetle (*Scolytus multistriatus*), associated with infected bark, were collected from symptomatic trees. Isolations from discolored sapwood areas and whole insects on potato dextrose agar amended with streptomycin sulfate (0.5 g l^{-1}) showed that the same fungus was recovered from all bark samples and from 22.5% beetles. Three isolates from bark (LMO_71-73) and one from insect (LMO_70) were subsequently characterized. Colonies on malt extract agar were creamy white with irregular lobed margins and fibrous-striate appearance, turning greyish with an average growth rate of $4.6 \pm 0.2 \text{ mm day}^{-1}$ at 20°C . Conidia ($4.9\text{--}7.5 \times 1.6\text{--}2.9 \text{ }\mu\text{m}$) from mycelium were hyaline, 1-celled, ellipsoid to elongate. Synnemata were hyaline producing ovoid to ellipsoid conidia ($3.9\text{--}6 \times 1.8\text{--}3.2 \text{ }\mu\text{m}$). BLASTn search of the internal transcribed spacer sequences (GenBank accession Nos. MK990093-MK990096) showed 100% similarity with MH055667 sequence, the sequences of β -tubulin gene (MN551190-MN551193) were 99.4% identical to MH283254, confirming that all isolates belonged to *Ophiostoma novo-ulmi* Brasier. Sequences of MAT1-2 gene (MW654200-MW654203) were 100% identical to KF961044, demonstrating that all isolates belonged to *O. novo-ulmi* ssp. *americana*. For each isolate, five one-year-old

U. procera seedlings were inoculated by cutting out a bark flap using a sterile cork borer 4 cm above the root collar. A mycelium plug (5 mm) was then placed on the exposed sapwood surface and covered with the bark flap and parafilm (Jankowiak 2013). All seedlings exhibited symptoms of leaf wilting and twig dieback after two months and the same fungus was consistently re-isolated from infected tissues. This represents the first report of *O. novo-ulmi* ssp. *americana* in Lebanon and highlights the role of *S. multistriatus*, recently reported in the area (Moussa and Tannouri 2018), in the severe epidemic observed.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s42161-021-00943-w>.

References

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