First report of bacterial canker on wild almond (*Prunus scoparia*) caused by *Pseudomonas syringae* pv. *syringae* in Iran

Mitra Omid Nasab¹ · Mahsa Moalem² · Milad Aeiini²

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Prunus scoparia, a wild almond species, is a deciduous large shrub with green shoots growing in vast regions of Iran. Since 2018, disease symptoms included internal necrotic tissues and reddish exudate in the form of droplets extruding from cankers on the twigs and stems of wild almond have been observed in some regions of Iran. Altogether, fifty-two samples were collected from the twigs and stems in different regions. Forty-five isolates with rod-shaped colonies and fluorescent pigments produced under ultraviolet light on King's B agar medium were isolated from symptomatic plants (King et al. 1954). Only eight bacterial strains representing each geographical region were randomly selected for further studies. These strains were Gram-negative, showed strictly aerobic metabolism of glucose, produced levan, and none produced oxidase, arginine dehydrolase and pectinase. They produced acid from glucose, arabinose, xylose, mannitol, mannose, sorbitol, and rhamnose (Schaad et al. 2001). All bacterial isolates caused a hypersensitive reaction on the tobacco leaves. In all tests, *Pseudomonas syringae* pv. *syringae* (BPIC 242) was used as a positive control. Isolates were deposited in the Culture Collection of the Bu-Ali Sina University of Iran with the following numbers: MO108, MO109, MO110, MO111, MO112, MO113, MO114, and MO115. To further identify these strains, a multilocus sequence analysis (MLSA) of the housekeeping genes for the representative isolate (MO111) was employed. The sequences of 16 S rDNA (GenBank accession No. MW138064), *rpoD* (MW147232), and *gapA* (MW147231) were 99.8–100 % similar to those of *P. syringae* pv. *syringae* isolates including type strains from several hosts in multiple countries in the NCBI database

(AM399036.1 for 16 S rDNA, KX160080 for *rpoD*, and KY594979 for *gapA*, respectively). To confirm the pathogenicity, stems of disinfected 2-year-old wild almond saplings were inoculated by injecting 30 µl of a bacterial suspension (1×10^7 CFU/ml). All the tested samples were kept in a moist chamber at 25 °C. After 14 to 18 days, typical symptoms similar to those occurring on naturally infected plants, appeared on the inoculated stems, whereas the control plants treated with sterile water remained symptomless. Re-isolates of *P. syringae* pv. *syringae* were obtained from inoculated stem of all saplings and identified as described above. To our knowledge, this is the first report of bacterial canker on *P. scoparia* caused by *P. syringae* pv. *syringae* in Iran.

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Declarations

Ethical statements This article does not contain any studies with human participants or animals performed by any of the authors.

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

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✉ Milad Aeiini
m.aeiini@scu.ac.ir

¹ Department of Plant Protection, Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran

² Department of Plant Protection, Faculty of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran