First report of *Alhagi maurorum* as a new plant host of ‘*Candidatus* Phytoplasma aurantifolia’ (subgroup 16SrII-C) in Iran

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Camelthorn (*Alhagi maurorum*, Fabaceae) is an important perennial weed in Iran. It is used as herbal medicine and more recently cultivated as a crop to feed the animals. During 2017–18, camelthorn witches’ broom disease was observed in Abarkooh area (Yazd province, Iran). The main disease symptoms were little leaf, yellowing, internode shortening, witches’ broom and stunting. Total DNA was extracted from 0.3 g of fresh midrib tissue of six diseased and four symptomless plants by the method of Zhang et al. (1998) and were tested for the presence of phytoplasma DNA by nested PCR using P1/P7 (Schneider et al. 1995) and R16F2n/R16R2 (Gundersen and Lee 1996) primer pairs. Expected amplicons of 1.8 and 1.250 kbp were obtained only from symptomatic but not from asymptomatic plants. R16F2n/R16R2 amplicons yielded the same RFLP patterns comparable with 16SrII-C subgroup strains (Lee et al. 1998) after restriction with *A*luI, *H*haI, *H*inI, *H*paII, *M*seI and *R*saI enzymes. Nested PCR products were cloned into *Escherichia coli* DH5α cells using InsT/A clone™ PCR Product Cloning Kit (Fermentas, Vilnius, Lithuania) and three plasmid DNAs from recombinant colonies were sequenced. The obtained sequences showed 100% identity with each other and were deposited in GenBank under accession numbers MT864675–MT864680. BLAST search analysis using obtained sequences showed highest sequence identity with phytoplasmas related to ‘*Candidatus* Phytoplasma aurantifolia’ species. Phylogenetic analysis clustered these sequences with 16SrII

group nearest to subgroup C strains. Computer-simulated RFLP analysis with 17 restriction endonucleases using *i*PhyClassifier showed that RFLP pattern derived from the camelthorn witches’ broom phytoplasma 16S rDNA R16F2n/R16R2 fragment is most similar to the reference pattern of the 16Sr group II, subgroup C (AJ293216). Alfalfa witches’ broom (AWB) associated with 16SrII-C strain, is an economically important phytoplasma disease in distributed areas of camelthorn witches’ broom disease. Based on the association with the same phytoplasma and collection of *Orosious albicinctus* leafhopper, vector of AWB disease (AWBD), on camelthorn plants, it seems that camelthorn plant may have an important role in epidemiology of AWBD. To our knowledge, this is the first report of camelthorn as a new plant host of ‘*Candidatus* Phytoplasma aurantifolia’, subgroup 16SrII-C.

Compliance with ethical standards

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

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