



# First report of '*Candidatus Phytoplasma trifolii*' (16SrVI group) infecting cabbage (*Brassica oleracea*) in Turkey

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*Brassica oleracea* is an economically important vegetable species. It is a member of the Brassicaceae family and widely cultivated worldwide as well as in Turkey. During late summer and autumn seasons of 2014 and 2015, a total of 331 cabbage samples exhibiting phytoplasma-like symptoms, such as deformation of leaves, abnormal coloration, stunting and failure to head were collected from in Niğde province located in Central Anatolia Region of Turkey. Total nucleic acids were extracted from leaf midribs of plants using the total nucleic acid isolation protocol (Prince et al. 1993). For initial screening of the samples, double nested PCR method was applied. 16SrRNA gene of DNA samples was amplified by direct PCR using P1/P7, followed by two sequential nested PCRs using R16F1/B6 and M1/M2 primer pairs, respectively. Out of 331, 29 of the samples revealed the expected ~500 bp amplicons after the last nested PCR with M1/M2 primer pair. In order to sequence bigger portion of the genome, the P1/P7 products were amplified with R16F2n/R16R2 primer pair. The obtained 1132 bp sequence belonged to TR-Lah19 isolate (GenBank accession No. MK392369) and had 99% identity with '*Candidatus Phytoplasma trifolii*' isolate from tomato plant (KY047614). Non ribosomal *secA* gene of the same isolate was amplified using SecAfor1/SecArev3 primers. Sequenced 772 bp nucleotides (MK392370) revealed 98% identity with previously published *secA* gene sequences of '*Ca. P. trifolii*' (KX784498) species belonging to the clover proliferation (CP) group (16Sr-VI). The CP group of phytoplasma infections in cabbage was previously reported in Iran and India (Salehi et al. 2007; Khasa et al. 2018). To best our

knowledge this is the first report of CP group phytoplasma infection of cabbage in Turkey.

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## Compliance with ethical standards

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

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

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