First report of prunus necrotic ringspot virus infecting apple in Turkey

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Apple (*Malus domestica*) is a widely grown fruit in various climate types of the world. Turkey is an important country for apple farming with 1.7 million da and 3.2 million tons of apple production in 2017. Apple is exposed to infection from many viruses during the growing period. In May 2017, a survey was conducted for plum pox virus (PPV) and prunus necrotic ringspot virus (PNRSV) of peach in the Bursa Province of Turkey. Leaves showing symptoms (mosaic, chlorosis, line patterns, ringspot and leaf curl) were collected from an apple garden near the peach growing areas. In addition to the peach leaves, 20 leaves from 20 different apple trees were also tested via ELISA and RT-PCR for PNRSV. Total RNA extraction and RT-PCR was performed with coat protein (CP) specific primers for PNRSV (F:5'-TCACTCTAGATCTCAAGCAG-3'), (R:5'-GAGCTCTGGTCCCACTCAGG-3') as described by Spiegel et al. (1999) that amplified a fragment of 616 bp. Eight of the 20 different apple trees were found to be infected with PNRSV by both RT-PCR and ELISA. The amplicon from two of the apple samples were sequenced and BLAST analysis was performed. BLAST analysis of these sequences (MH444792-MH472637) in GenBank showed a high similarity (98–99%) between PNRSV isolates from Ecuador (*Rosa* sp.; KX646549), Poland (*Prunus avium*; DQ983498) and China (Sweet cherry; MF145081). Moreover, *Cucumis sativus* was inoculated with sap from three of the PNRSV

infected samples (Elm-1, Elm-2 and Elm-3) and one control (PNRSV free) and maintained in a plant growth cabinet. After 18 days, the indicator plant developed local chlorotic spots and stunting that tested positive by using RT-PCR, while the control plant showed no symptoms. PNRSV infection is commonly found worldwide in stone fruits, this virus has been reported previously in apple in India (Chandel et al. 2008) and China (Hu et al. 2016). However, to our knowledge this is the first report of PNRSV in apple in Turkey.

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