

DISEASE NOTE

FIRST REPORT OF MIXED INFECTION OF PAPAYA RINGSPOT VIRUS AND PAPAYA LEAF DISTORTION MOSAIC VIRUS ON *CARICA PAPAYA* L.

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Papaya ringspot virus (PRSV) and *Papaya leaf distortion mosaic virus* (PLDMV) from the family *Potyviridae* produce similar symptoms in papaya such as foliar mosaic, ringspots and distortion, water soaking streaks on petioles, and ringspots on fruit. PRSV is the most widespread and destructive viral disease damaging papaya production in the world, whereas PLDMV was recently identified in China (Tuo *et al.*, 2013). In March 2014, 23 papaya trees displaying disease symptoms similar to those of PRSV or PLDMV were observed in Haikou (Hainan Island, China). Six samples were co-infected with PRSV and PLDMV, as shown by DAC-ELISA with antisera to PRSV or PLDMV. Mixed infection was subsequently confirmed by RT-PCR using PRSV-specific primers designed in a highly conserved region of gene *P3* (*P3-F*, 5'TTGTGTAC-GACTTCTCACCGAA3' and *P3-R*, 5'CGAATGTCATC-CAAAGACT GATGATAAAC3') and PLDMV-specific primers designed in a highly conserved region of the coat protein (*CP*) gene (*CP-F*, 5'GGCATGTGGTTTATGATGCAAGG G3' and *CP-R*, 5'GCTCCGTGTTCTCAGTCGCATT3'). DNA fragments of the expected size (613 and 355 bp, respectively) were amplified from each mixed infected sample using PRSV and PLDMV-specific primers, and then cloned and sequenced. BLASTn analysis of the nucleotide sequences obtained from the cloned PCR products showed 99% identity with a PRSV isolate from Hainan (GenBank accession No. EF183499) and 100% identity with a PLDMV isolate from Hainan (GenBank accession No. JX974555) (Lu *et al.*, 2008; Tuo *et al.*, 2013). To our knowledge, this is the first report of mixed infection of PRSV and PLDMV on papaya, prompting the need for evaluating the potential threat of the mixed virus infection to papaya production.

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FIRST REPORT OF ROSEMARY LEAF SPOT CAUSED BY *PHOMA GLOMERATA* IN IRAN

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Rosemary (*Rosemarinus officinalis*) is an ornamental and medicinal plant grown in Iran. During a survey in November 2012, symptoms of wilt and leaf spot were observed in almost half of rosemary fields of Kerman (southeast of Iran). Samples of infected leaves were surface sterilized with 0.5% sodium hypochlorite, rinsed with sterile distilled water, cultured onto potato dextrose agar (PDA) medium and incubated at 25°C for seven days. The isolated fungus produced a pale brown to dark green colony. Ovoid or ellipsoidal, hyaline, and aseptate conidia were produced abundantly in subglobose pycnidia. Numerous dictyochlamydospores and chlamydospores were also observed. Based on the morphological characters, the fungus was identified as *Phoma glomerata* (Boerema *et al.*, 2004).

To confirm the species of the fungus, DNA was extracted from a single spore isolate and the internal spacer regions (ITS) were amplified with universal primers ITS1 and ITS4. The resulting sequence (532 bp), which showed more than 99% identity with *Phoma glomerata*, was submitted to NCBI GenBank (Accession No. KM114267).

To test the pathogenicity, two month old plants were sprayed by a suspension of 10⁴ spores per ml, covered with plastic bags and incubated under greenhouse conditions at 25-28°C. Pale brown small spots were developed on an average of 31.48% of the leaves after seven days. This fungus has been previously reported from Iran on cucumber (Hatami *et al.*, 2008) and *Ficus elastica* (Aghapour *et al.*, 2009). To the best of our knowledge, this is the first report of *Phoma glomerata* on rosemary in Iran and possibly in the world.

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