First report of bacterial leaf spot on calla lily (*Zantedeschia* spp.) caused by *Pseudomonas viridiflava* in Iran

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In spring 2016 a leaf spot of calla lily (*Zantedeschia* spp.) was noted in Mazandaran province in Iran for the first time. During the early stages, spots were small, circular and brown, then water soaked spots appeared on the leaves, enlarged and coalesced to cover a large leaf. Leaf spots were triturated in sterile distilled water and the suspensions were streaked onto nutrient agar medium supplemented with 5% sucrose (NSA). Four days after streaking, 2 mm cream-colored colonies appeared. Twelve strains with bluish fluorescent pigments on King's B were selected. Isolates were negative for oxidase, urease, indole, hydrolyze of starch, arginine dihydrolase, 3'-ketolactose, reducing substances from sucrose, phenylalanine deaminase, but positive for hypersensitive reaction on geranium (*Pelargonium x hortorum*), potato soft rot, nitrate reduction, tyrosinase, hydrolysis of arbutin, casein, esculin, gelatin and Tween 20. Strains used L-valine, L-proline, L-serine, L-arabinose, L-glutamine, D- tartrate, D-xylose, D-galactose, D-sorbitol, succinate, fumarate, melibiose, sucrose, glucose, mannitol, malonate, fumarate, but not cellobiose, L-tartrate, L-sorbose, maltose, raffinose and lactose, as carbon source (Sarris et al. 2012). In all tests, *Pseudomonas viridiflava* (ATCC 13223) isolated from dwarf bean in Switzerland, was used as a positive control. The calla isolates were deposited in the culture collection of microorganisms in Vali-E-Asr University of Rafsanjan (Iran). For pathogenicity tests *Zantedeschia aethiopica* plants were injected with bacterial suspensions, (10^6 cfu per ml). Disease symptoms appeared

within 8 days post inoculation, similar to those observed under natural infections in the field. Bacterial colonies were consistently re-isolated from the inoculated leaves and morphologically identified as *P. viridiflava*. BLAST analysis of the sequence of the housekeeping gene *rpoD* (656 bp) obtained from a selected strain (strain "sh") (GenBank accession No. KY764289.1) revealed a 100% similarity to sequences of other *P. viridiflava* strains. To our knowledge this is the first report of a leaf spot disease on calla lily caused by *P. viridiflava*. It was earlier reported from Iran in 2012, but on another hosts (Heydari et al. 2012).

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