Diseases Caused by Viruses

First Report of *Coleus blumei* Viroid 1 in Commercial *Coleus blumei* in the United States

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Coleus scutellarioides (syn. *Coleus blumei*) is a widely grown evergreen ornamental plant valued for its highly decorative variegated leaves. Six viroids, named *Coleus blumei* viroid 1 to 6 (CbVd-1 to -6) have been identified in *coleus* plants in many countries of the world (Nie and Singh 2017), including Canada (Smith et al. 2018). However there have been no reports of *Coleus blumei* viroids occurring in the United States (Nie and Singh 2017). In April 2021, leaf tissue samples from 27 cultivars of *C. blumei*, one plant of each, were submitted to the University of Idaho laboratory from a commercial nursery located in Oregon to screen for the presence of viroids. The sampled plants were selected randomly, and no symptoms were apparent in any of the samples. Total nucleic acids were extracted from each sample (Dellaporta et al. 1983) and used in reverse-transcription polymerase chain reaction (RT-PCR) tests (Jiang et al. 2011) for the CbVd-1 and CbVd-5 with the universal primer pair CbVds-P1/P2, which amplifies the complete genome of all members in the genus *Coleviroid* (Jiang et al. 2011), and two additional primer pairs, CbVd1-F1/R1 and CbVd5-F1/R1, specific for CbVd-1 and

CbVd-5, respectively (Smith et al. 2018). Five *C. blumei* plants (cvs. Fire Mountain, Lovebird, Smokey Rose, Marrakesh, and Nutmeg) were positive for a coleviroid based on the observation of the single 250-nt band in the RT-PCR test with CbVds-P1/P2 primers. Two of these CbVd-1-positive plants (cvs. Lovebird and Nutmeg) were also positive for CbVd-1 based on the presence of a single 150-nt band in the RT-PCR assay with CbVd1-F1/R1 primers. One plant (cv. Jigsaw) was positive for CbVd-1 (i.e., showing the 150-nt band in RT-PCR with CbVd1-F1/R1 primers) but did not show the ~250-bp band in RT-PCR with primers CbVds-P1/P2. None of the tested plants were positive for CbVd-5, either with the specific or universal primers. All coleviroid- and CbVd-1-specific PCR products were sequenced directly using the Sanger methodology and revealed whole genomes for five isolates of CbVd-1 from Oregon, U.S.A. The genomes of the five CbVd-1 isolates displayed 96.9 to 100% identity among each other and 96.0 to 100% identity to the CbVd-1 sequences available in GenBank. Because the sequences from cultivars Lovebird, Marrakesh, and Nutmeg were found to be 100% identical, one sequence was deposited in GenBank (MZ326145). Two other sequences, from cultivars Fire Mountain and Smokey Rose, were deposited in GenBank under accession numbers MZ326144 and MZ326146, respectively. To the best of our knowledge, this is the first report of CbVd-1 in the United States.

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