

## First Report of Natural Infection of *Penstemon acuminatus* with *Cucumber mosaic virus* in the Treasure Valley Region of Idaho and Oregon

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Penstemons are perennials that are grown for their attractive flowers in the United States. Penstemon species (*P. acuminatus*, *P. deustus*, and *P. speciosus*) are among the native forbs considered as a high priority for restoration of great basin rangelands. During the summer of 2008, symptoms of red spots and rings were observed on leaves of *P. acuminatus* (family Scrophulariaceae) in an experimental trial in Malheur County, Oregon where the seeds from several native forbs were multiplied for restoration of range plants in intermountain areas. These plants were cultivated as part of the Great Basin Native Plant Selection and Increase Project. Several native wildflower species are grown for seed production in these experimental plots. Plants showed red foliar ringspots and streaks late in the season. Fungal or bacterial infection was ruled out. Two tospoviruses, *Impatiens necrotic spot virus* and *Tomato spotted wilt virus*, and one nepovirus, *Tomato ring spot virus*, are known to infect penstemon (2,3). Recently, a strain of *Turnip vein-clearing virus*, referred to as Penstemon ringspot virus, was reported in penstemon from Minnesota (1). Symptomatic leaves from the penstemon plants were negative for these viruses when tested by ELISA or reverse transcription (RT)-PCR. However, samples were found to be positive for *Cucumber mosaic virus* (CMV) when tested by a commercially available kit (Agdia Inc., Elkhart, IN). To verify CMV infection, total nucleic acid extracts from the symptomatic areas of the leaves were prepared and used in RT-PCR. Primers specific to the RNA-3 of CMV were designed on the basis of CMV sequences available in GenBank. The primer pair consisted of CMV V166: 5' CCA ACC TTT GTA GGG AGT GA 3' and CMV C563: 5' TAC ACG AGG ACG GCG TAC TT 3'. An amplicon of the expected size (400 bp) was obtained and cloned and sequenced. BLAST search of the GenBank for related sequences showed that the sequence obtained from penstemon was highly identical to several CMV sequences, with the highest identity (98%) with that of a sequence from Taiwan (GenBank No. D49496). CMV from infected penstemon was successfully transmitted by mechanical inoculation to cucumber seedlings. Infection of cucumber plants was confirmed by ELISA and RT-PCR. To our knowledge, this is the first report of CMV infection of *P. acuminatus*. With the ongoing efforts to revegetate the intermountain west with native forbs, there is a need for a comprehensive survey of pests and diseases affecting these plants.

*References:* (1) B. E. Lockhart et al. *Plant Dis.* 92:725, 2008. (2) D. Louro. *Acta Hort.* 431:99, 1996. (3) M. Navalinskiene et al. *Trans. Estonian Agric. Univ.* 209:140, 2000.