



First report of Cassava common mosaic virus and Cassava frogskin-associated virus infecting cassava in Argentina

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1 First report of *Cassava common mosaic virus* and Cassava frogskin- 2 associated *virus* infecting cassava in Argentina

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8 Cassava (*Manihot esculenta* Crantz) is the third most important source of calories for human
9 nutrition in the world. In Argentina, cassava is largely produced in the northeastern region with the
10 Misiones province accounting for the majority of the production for industrial purposes while in
11 Corrientes and Formosa provinces, cassava is primarily grown for direct human consumption. Since
12 cassava is vegetatively propagated, it is prone to the buildup of virus infections which are
13 associated with severe root and leaf symptoms (Carvajal-Yepes et al., 2014) and significant yield
14 reductions. Recent field surveys in Argentina have identified the presence of severe leaf mosaic
15 symptoms in local cassava varieties while historical virus indexing records of cassava plantlets
16 maintained *in vitro* at the International Center for Tropical Agriculture (CIAT) indicate the presence
17 of *Cassava common mosaic virus* (CsCMV; genus *Potexvirus*) in Argentinian accessions collected in
18 1993. To confirm the current presence of CsCMV in Argentina, a total of 19 samples were collected
19 in 2012 and 2014 from the fields in Corrientes (Corrientes), El Colorado (Formosa) and Puerto Rico
20 (Misiones), and assayed for CsCMV and other viruses reported in the Americas (Carvajal-Yepes *et al.*,
21 2014). These plants showed virus-like symptoms including leaf mosaic and leaf deformation. Plate
22 trapped antigen (PTA)-ELISA tests (antiserum kindly provided by Dr. Eliezer Rodrigues Souto,
23 Universidade Estadual de Maringá, Brazil) readily detected CsCMV in 16 out of the 19 samples.
24 Negative samples could be explained by low virus titers and/or the specificity of the antiserum
25 used. Mechanical transmissions to experimental hosts induced the formation of characteristic
26 symptoms previously described for CsCMV including systemic mild mosaic in *Nicotiana*
27 *benthamiana* and *N. occidentalis* and local chlorotic lesions in *Chenopodium quinoa* and *C.*
28 *amaranticolor*. RT-PCR (Gibbs et al., 1998; Calvert et al., 2008) confirmed the presence of CsCMV in
29 the originally collected cassava samples and detected a mixed infection with Cassava frogskin-
30 associated virus (CsFSaV; tentative genus *Oryzavirus*) in one plant. PCR products from three
31 independent CsCMV-positive samples were cloned into plasmid vectors and sequenced using
32 standard procedures. Sequence analysis of the replicase region of CsCMV obtained using universal
33 potexvirus primers (GenBank accession KP025969) showed a nucleotide identity of 87 and 92% with
34 two Brazilian isolates sequences available in GenBank (U23414 and JF913280, respectively). For
35 CsFSaV, sequence analysis of a conserved region (958 bp) of the segment 4 encoding the replicase
36 gene (GenBank accession KJ742699), detected a nucleotide identity of 88-99% with Colombian and
37 Brazilian isolates (Calvert et al., 2008; De Souza et al., 2014). Symptoms caused by CsCMV in single
38 infection can reduce yields significantly and although no obvious difference in symptoms was

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1 observed in the mixed infected plant detected in this study, the inadvertent accumulation and
2 propagation of additional virus infections could affect dramatically the growing cassava industry in
3 Argentina as it has been occurring in other countries (Carvajal-Yepes et al., 2014).

4 **REFERENCES**

- 5 Calvert et al., *Journal of Phytopathology*, 156, 647, 2008.
6 Carvajal-Yepes et al., *Virus Research*, 186, 76, 2014.
7 De Souza et al., *Plant Disease*, 98, 771, 2014.
8 Gibbs et al., *Journal of Virological Methods*, 74, 67, 1998.